Idle Hour North Stormwater Project
Preliminary Engineering Report
Lexington-Fayette Urban County Government
February 8, 2012

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Preliminary Engineering Report
Idle Hour North Project
Lexington, Kentucky

February 8, 2012

Prepared for:
Lexington-Fayette Urban County Government
Division of Water Quality

Engineers · Architects · Planners

Prepared by:
GRW Engineers, Inc.
Lexington, Kentucky

EXECUTIVE SUMMARY

GRW Engineers, Inc. was retained by LFUCG to assist with the Supplemental Environmental Projects required in the Consent Decree to identify near-term flood relief or elimination actions that result in at least $3.0 million in capital flood mitigation projects. This preliminary engineering report is one of the capital flood mitigation projects.

This preliminary engineering report includes a description of the Idle Hour North flooding problem, documentation of resident's concerns gathered from questionnaires and meetings, and the results of a hydrologic and hydraulic model of the stormwater system. This report recommends viable mitigation alternatives, identifies pitfalls such as easement acquisition, and provides costs for final design, easement acquisition, and construction.

In 2002, questionnaires were sent to residents of the Idle Hour neighborhood to determine the extent and causes of flooding in the neighborhood.

Flooding Questionnaire Summary 2002

Address	Flooding Reported		Comment
	Home	Street	
2020 St Michael	Yes	Yes	Overland flow
2016, 2020, and 2024 St Teresa	Yes	Yes	Overland Flow
2016 and, 2020 St Christopher	Yes	Yes	Overland Flow
2024 St Michael	No	Yes	Overland Flow
2012 St Teresa	No	Yes	Overland Flow
2017 St Christopher	No	Yes	Overland Flow

An engineering survey has been completed in the area. The survey data was used verify the location of existing structures. A hydraulic model was developed and flood mitigation alternatives were developed. Alternatives were tested using the model.

GRW has identified two viable alternatives that will mitigate both home and street flooding and one alternative that would mitigate home flooding only. The recommended alternative would add additional curb inlets, and install additional pipes along a new alignment to increase capacity. The opinion of probable cost for the recommended alternative is $706,000.

TABLE OF CONTENTS

1. SCOPE OF WORK

The project is listed as "Idle Hour North" on the Stormwater Priority Projects Master List.

Project Priority	and Name	Water-shed	Council District	Severity Score	CPI Adjusted Estimate	Efficiency Value	Comments
66.3	**Idle Hour North**	WH	7	1,027	$1,277,000	$1,243 Per Severity Point	New project added in 2002 Address after December 2004

Scope

This project was undertaken in connection with the settlement of an enforcement action under the Clean Water Act, United States et al. v. Lexington-Fayette Urban County Government, brought on behalf of the U.S. Environmental Protection Agency. This project is a Supplemental Environmental Project ("SEP") to be funded by LFUCG as part of the Consent Decree entered on January 3, 2011 styled United States & Commonwealth of Kentucky v. Lexington-Fayette Urban County Government, United States District Court for the Eastern District of Kentucky, Civil Action No. 5:06-cv-386-KSF (the "Consent Decree").

The SEP is detailed in Appendix K-2 of the Consent Decree; it discusses the use of a portion of the stormwater management fee for flooding projects, specifically, $30 million over 10 years. It also includes a requirement to evaluate the priority list methodology. GRW's scope of work is:

(1) identify near-term flood relief or elimination actions that result in at least $3.0 million in capital flood mitigation projects;

(2) evaluate the priority list methodology and recommend improvements; and

(3) develop a Master Planning Work Plan to guide the development of watershed based master plans for stormwater capital improvements.

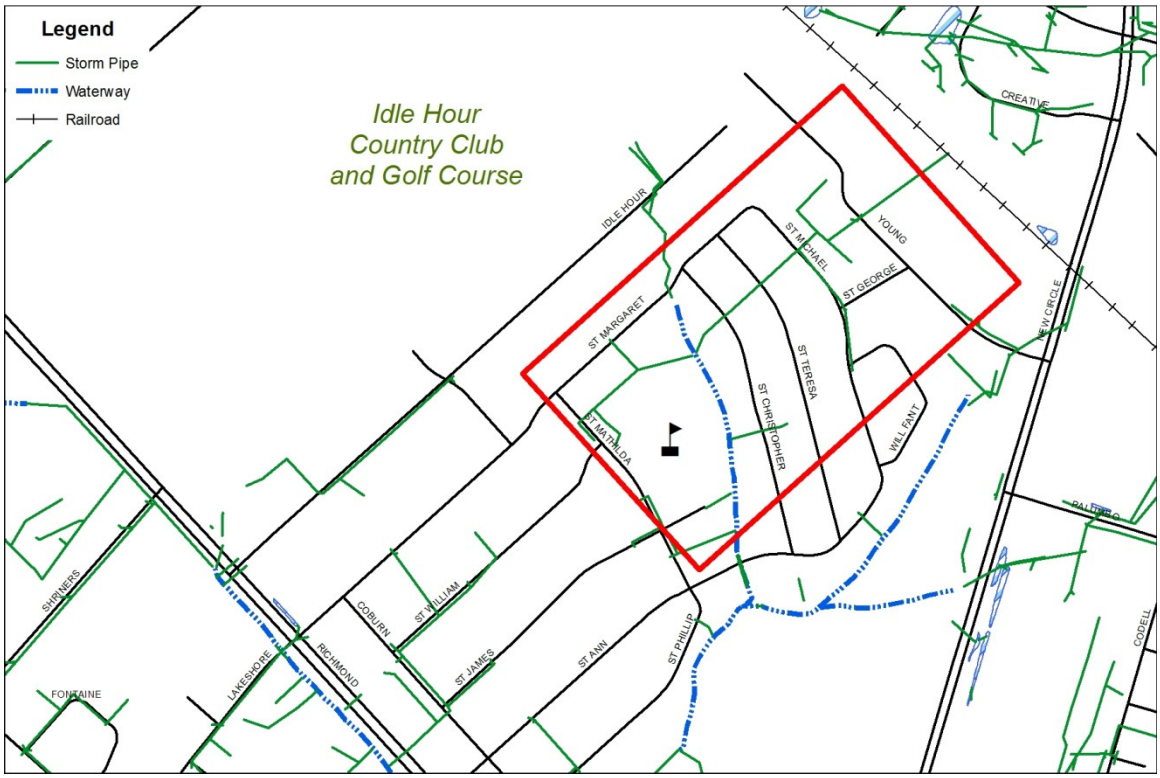
The deliverables for item (1) of the scope of work are preliminary engineering reports for the highest ranking projects listed on the Stormwater Priority Projects Master list. Idle Hour North is number ten on the list. This preliminary engineering report includes a description of the flooding problem, documentation of resident's concerns (gathered from questionnaires and meetings), viable mitigation alternatives, identification of pitfalls such as easement acquisition, and estimated costs for final design, easement acquisition, and construction.

The LFUCG criterion for determining flooding problems and flood mitigation projects is the 25-year, 24-hour storm.

General Location

The project area is located in south-central Lexington. The Idle Hour North project area is located north of the New Circle Road and Richmond Road intersection and southeast of the Idle Hour Country Club.

The project area is entirely within Council District 5. It is within the West Hickman Creek watershed and is part of Idle Hour Neighborhood Association.



Background

In 2002, the LFUCG Division of Engineering received inquiries regarding stormwater flooding in the Idle Hour area. The LFUCG Division of Engineering sent questionnaires to several residences in the Idle Hour neighborhood to determine the cause and severity of the flooding. These questionnaires were received as early as September 2002 and reported home and street flooding along the storm sewer through the neighbor.

2. PROJECT LOCATION

Study Boundary

The extent of the detailed study area generally follows the storm sewer that begins on Young Drive and carries stormwater to the stream located behind Breckinridge Elementary School. The storm sewer intersects three roadways; St. Michael, St. Teresa, and St. Christopher. Curb inlets are located on both sides of each street along the storm sewer.

General Topography

The project area includes the Idle Hour Neighborhood of the West Hickman Watershed. The area generally slopes to the southwest, from an elevation of about 1030 feet at the railroad near Young Drive to elevation 990 feet at the stream.

A topographical map of the area is shown in Exhibit 1.

Project Area Soils

According to the Natural Resources Conservation Service web soil survey, the project area consists primarily of "made land" over clayey materials, urban land, and Newark silt loam. All are soils in the hydrologic soil group C.

FEMA Flood Mapping

None of the project area is within the mapped FEMA floodplain.

Existing Infrastructure

Existing infrastructure for the study area is shown in Exhibit 2 and includes:

- A 24-inch storm sewer that begins at Young Drive and conveys stormwater through the neighborhood to a headwall at the stream behind Breckinridge Elementary School.
- Surface inlets connected to the storm sewer between Young Drive and St. Michael Drive.
- Curb inlets connected to the storm sewer both sides of the street on St. Michael Drive, St. Teresa Drive, and St. Christopher Drive.

Drainage Areas

Stormwater from the parking lot of the WT Young building flows southwest towards the surface inlets and the 24-inch sewer that extends through the Idle Hour neighborhood. The storm sewer discharges to the stream behind Breckinridge Elementary School. Roof, street and yard drainage from most of St. Michael and St. Teresa, and half of St. Christopher drains to curb inlets connected to the 24-inch storm sewer.

Exhibit 3 shows the five major drainage areas in the Idle Hour project area.

3. DATA COLLECTION

Existing Mapping

Are stormwater structures have been mapped by LFUCG Division of Water Quality. Structures and storm pipes are included in the LFUCG GIS database. The locations of storm structures (point features) in the database are from a sub-meter horizontal GPS survey that did not include elevation information.

The LFUCG GIS uses a naming convention for storm structures of the form: WE7_337CI, where WH indicates the major watershed, 7 is a subwatershed indicator, 337 is the structure number, and CI indicates that it is a curb inlet. All structures for the Idle Hour North project are in West Hickman subwatershed 7, so all begin with WH7. Other structure types are HW: headwall; SI: surface inlet; MH: manhole.

Survey

Hall Harmon Engineers, Inc. completed a survey of the flood prone area on September 15, 2011. Data including storm sewer pipe size, material, and inverts, road centerlines, cross-sections of roads at sag points, and grade elevations at low points of buildings were collected. The data collected are provided in Appendix A.

Field Reconnaissance

Field reconnaissance was conducted by GRW to verify topography, and get a better understanding of what is causing the home flooding. Hall Harmon Engineers, Inc. also conducted field reconnaissance while collecting survey information.

4. QUESTIONNAIRES

In 2002 questionnaires were sent by the LUFCG Division of Engineering to residents in the Idle Hour neighborhood area. Several residents indicated flooding in their homes and streets. Many believed the cause of the problem was inadequate curb inlets or storm sewers, while others believed the cause was the new parking area for the WT Young building. The residents stated that the stormwater could not enter the storm sewers at the curb inlets, and flood water flowed between the houses on St. Michael Drive, St. Teresa Drive, and St. Christopher Drive. The questionnaires indicated a flooding frequency of about once per year, and some property damage.

The completed questionnaires from 2002 can be found in Appendix B.

Table 1

2002 Questionnaire Summary

From Upstream to Downstream

Address	Home Flooding	Street Flooding	Sewage Evidence
2020 St. Michael	Yes	Yes	N/A
2024 St. Michael	No	Yes	N/A
2012 St. Teresa	No	Yes	Yes
2016 St. Teresa	Yes	Yes	No
2020 St. Teresa	Yes	Yes	Yes
2024 St. Teresa	Yes	Yes	No
2016 St. Christopher	Yes	Yes	Yes
2017 St. Christopher	No	Yes	No
2020 St. Christopher	Yes	Yes	N/A
2025 St. Christopher	No	Yes	N/A

5. HYDROLOGIC AND HYDRAULIC ANALYSIS

Hydrologic Analysis

The flooded area of the neighborhood is localized to the area near the curb inlets and storm sewer system. Due to the small size of the watershed, the Rational Method was used to calculate peak flow through the area. In order to determine the flow of each pipe section and curb inlet, the drainage area was broken up into four sub-basins. For each sub-basin, the time of concentration was estimated to be ten minutes (the minimum according to TR 55 methodology). Time of concentration was used to determine the rainfall intensity from the 25-year intensity-duration-frequency (IDF) curve. The 25-year rainfall intensity is 6.0 inches/hour based on a time of concentration of 10 minutes. . A composite runoff coefficient, C, was computed based on a 0.95 C value for impervious surface and 0.2 C value for pervious surfaces. Table 2 shows a summary of the hydrologic parameters used in the rational method, as well as the peak runoff of each sub-basin.

Table 2
Hydrologic Parameters

Area	Sub-Basin	Area (acres)	Impervious Area	Composite C	Peak Flow* (cfs)
Young Drive	1	7.1	80%	0.80	34.1
St. Michael	2	10.8	64%	0.68	44.1
St. Teresa	3	7.8	47%	0.56	26.2
St. Christoper	4	4.4	49%	0.57	15.0

*Based on time of concentration 10 minutes and rainfall intensity 6.0 inches/hour

Hydraulic Analysis

The hydraulic component of the project consists of the storm sewer system that travels between homes on St. Michael Drive, St. Teresa Drive, and St. Christopher Drive. The hydraulic capacity of the system was calculated using Manning's equation. The peak flow at various points in the system was calculated using StormCad, V8i. The tables below show a summary of the hydraulic parameters and capacity of the system. The peak flows shown in Table 3 are the cumulative peak flows through each pipe and all cases exceed the pipe capacity.

Table 3
Pipe Hydraulic Parameters

Pipe Location	Pipe Size (Inches)	Pipe Slope	Pipe Capacity (cfs)	Peak Flow (cfs)
From Young Dr to St. Michael	24	1.7%	29.6	34.0
Across St. Michael	24	1.5%	27.8	61.0
From St. Michael to St. Theresa	24	1.8%	30.4	69.1
Across St. Theresa	24	1.9%	31.3	88.6
From St. Theresa to St. Christopher	24	2.9%	38.6	94.7
Across St. Christopher	24	1.2%	24.9	105.9
From St. Christopher to property line	24	3.0%	39.3	109.3
From property line to creek	30	1.2%	45.1	109.2

In addition to pipe capacity problems, peaks flows to inlets also exceeds inlet capacity, as shown in Table 4. Inlet capacity was calculated using formulas in Chapter 6 of the LFUCG stormwater manual.

Table 4
Inlet Hydraulic Parameters

Location	Inlet ID	Drainage Area (acres)	Composite C	Inlet Capacity (cfs)	Inlet Peak Runoff (cfs)
St. Michael	**WH7_330CI**	1.89	0.67	4.7	7.6
St. Michael	**WH7_332CI**	2.08	0.65	4.7	8.2
St. Theresa	**WH7_333CI**	6.19	0.53	4.9	19.9
St. Theresa	**WH7_334CI**	1.59	0.65	4.9	6.3
St. Christopher	**WH7_336CI**	3.45	0.55	4.9	11.6
St. Christopher	**WH7_337CI**	0.92	0.64	4.9	3.6

Tables 3 and 4 indicate that the 25-year event peak flows exceed the capacity of the inlets and pipes. Due to the insufficient capacity, stormwater runoff cannot enter the system. It then travels overland to the tributary, flooding adjacent homes.

Due to the small size of the drainage basins and storm sewer system associated with this project, a StormCad model was created to determine pipe and inlet capacities. The model, while not giving specific water surface elevations, showed surcharging pipes, and insufficient capacities similar to what has been reported by residents. The Rational Method was used to determine peak runoff rates. No calibration was performed.

6. ALTERNATIVE ANALYSIS

Evaluation Criteria

The existing conditions include a lack of pipe and inlet capacity. Alternative ways of increasing the system capacity were developed to mitigate home flooding. Each alternative was compared to the existing conditions, and more specifically, the ability of each to improve both the pipe and inlet capacity in order to keep the stormwater from surcharging. If stormwater doesn't surcharge out of the system, both home and street flooding would be mitigaed. Surcharging occurs when the hydraulic grade line elevation exceeds the ground elevation. Each alternative was compared based on surcharging at four representative inlets during the 25-year storm, as shown in Table 5.

Table 5
Alternatives Summary

Location	Ground Elevation	EXISTING CONDITION	ALTERNATIVE 1 Larger Pipes, New Alignment	ALTERNATIVE 2 Larger Pipes, Current Location	ALTERNATIVE 3 Buy 6 homes
Hydraulic Grade Line at					
Young Dr WH7_329SI	1012.1	1009.8	1007.8	1006.7	1009.8
St Michael WH7_332CI	1007.0	1022.8	1001.7	1003.6	1022.8
St Theresa WH7_334CI	1001.6	1030.2	998.5	999.4	1030.2
St Christopher WH7_337CI	993.4	1021.8	991.9	993.1	1021.8
Inlets Surcharging		4	0	0	4
Easements Required		---	1	6 to 11	---
Opinion of Probable Cost		---	$706,000	$625,000	$862,000

Alternative 1

Alternative 1 would install additional pipes on a new alignment with new curb inlets, and add inlets to the existing system. The new storm sewer piping would intercept and divert stormwater runoff from Young Drive and St. Michael. This would reduce peak flow for the existing system. The new system would run northwest on St. Michael, turn and run southwest on St. Margaret. The new storm sewer would join with an existing storm sewer southwest of St. Christopher and discharge from a new headwall to the existing stream behind Breckenridge Elementary School. New inlets connected to the new system are proposed for St. Michael, St. Margaret, St. Teresa and St. Christopher. One existing inlet on St. Michael will be replaced to accommodate the new system. See Exhibit 4.

New inlets connected to the existing system will be installed on St. Teresa Drive and St. Christopher Drive. There will be a total of twelve (12) new inlets:

- 5 on St. Michael Drive (including a replacement inlet)
- 1 on St. Margaret Dive,
- 5 on St. Teresa Drive
- 1 on St. Christopher Drive.

New pipes include:

- 800 LF of 18" RCP for connection of the new inlets on St. Michael and St. Teresa
- 160 LF of 19" elliptical pipe for connection of the new inlet on St. Christopher,
- 300 LF of 30" RCP to replace the storm sewer from Young Drive to St. Michael, connecting to
- 850 LF of 36" RCP for a new storm sewer along a portion of St. Michael and St. Margaret, connecting to
- 160 LF of 42" RCP along St. Margaret, and discharging to a headwall at the stream.

These pipes, along with the existing system, will convey the 25-year, storm event. Alternative 1 will mitigate home and street flooding during the design storm by improving both inlet and pipe capacity. Improving inlet capacity will help mitigate the home and street flooding by allowing water to enter the pipe system as opposed to ponding in the road. Improving pipe capacity will allow the water to enter the storm sewer system without surcharging into the road.

The opinion of probable cost for Alternative 1 is $706,000. Details are provided in Appendix C.

Alternative 2

Alternative 2 would increase the existing storm sewer pipes in their current location and add new curb inlets. Increasing the pipe capacity would allow the stormwater to remain in the pipes instead of surcharging during the design storm. The inlets on St. Michael, St. Teresa and St. Christopher as described in Alternative 1 would be included. An existing curb inlet on St. Michael and one on St. Teresa may need to be replaced to accommodate connections to the larger system. See Exhibit 5.

The new pipes will include:

- 1,100 LF of 18" RCP for connection of the new inlets on St. Michael and St. Teresa
- 160 LF of 19" elliptical pipe for connection of the new inlet on St. Christopher
- 130 LF of 30" RCP to replace the storm sewer from Young Drive to St. Michael connecting to
- 260 LF of 36" RCP to replace the storm sewer from St. Michael to St. Teresa, and
- 520 LF of 42" RCP to replace the storm sewer from St. Teresa to a new headwall.

These pipes will convey the 25-year, storm event. Alternative 21 will mitigate home and street flooding during the design storm by adding both inlet and pipe capacity. Additional inlets will help mitigate the home and street flooding by allowing water to enter the pipe system as opposed to ponding in the road. Improving pipe capacity will allow the water to enter the storm sewer system without surcharging into the road.

The opinion of probable cost for Alternative 2 is $625,000. Details are provided in Appendix C.

Alternative 3

Alternative 3 would buy all six houses that reported flooding on the 2002 questionnaires. Assessed property values were found in the Fayette County PVA database. The costs for these acquisitions are shown in Appendix C. This alternative does not eliminate street flooding.

The opinion of probable cost for Alternative 3 is $862,000

Construction Constraints

Based on the LFUCG GIS information, a sanitary sewer is present and follows the existing storm sewer through the neighborhood. House laterals appear to be directed to collectors behind the houses. The sanitary sewer inverts "depth below grade" were obtained from LFUCG inspection reports. These were converted to approximate elevations and compared with the storm sewer inverts. The sanitary sewer appears to be five or more feet below the proposed storm sewer invert of Alternative 1. For Alternative 2, the inverts of the storm sewer will not be changed from the existing storm sewer, and it appears that the sanitary sewer is two or three feet below the storm sewer inverts. The depths of the sanitary sewer and any affected laterals will need to be verified during final design.

The locations of other utilities in the area are unknown and will need to be determined. Columbia Gas, Kentucky American Water Company, AT&T, Insight Communications, Windstream, and others all provide service to the area. Alternative 2 would be in close proximity of existing homes, and may require easement acquisition between the homes. Construction space between homes is limited. Alternative 1 and 2 will require roadway construction work. These are neighborhood roads, so careful consideration needs to be given to access and construction timing.

Public Review of Alternatives

A public meeting will be held to present the findings of this report to the public. The meeting date has not been set.

7. CONCLUSIONS

GRW has evaluated the flooding in the Idle Hour North area and determined that the existing stormwater sewers do not have the capacity to carry the peak runoff from the 25-year, event. The pipes are unable to convey the runoff from the design storm, and the inlets are unable to capture all of the runoff and get it into the system. In order to mitigate home and street flooding in the area, both capacity issues must be addressed.

A hydraulic model was used to analyze two alternatives:

- Alternative 1 which adds a new storm sewer system to the neighborhood, and
- Alternative 2 which replace the existing storm sewer with a larger system.

Both alternatives mitigate home and street flooding by improving both the inlet and pipe system capacity issues. Since there are two viable solutions to mitigating flooding in the area, it is important to consider cost, schedule, and effects on the public.

Alternative 2 is less expensive than Alternative 1; however, it is a project that requires multiple easements. Also, Alternative 2 will cause more disruption to the surrounding homes due to construction being done in the backyards of several residents. This has a significant effect on the construction schedule. Potential delays, with the worst case of stopping construction to settle property owner disputes, must be considered by contractors when preparing bids. This potential cost is not accounted for in our opinion of probable cost; however, it is the opinion of GRW that it could be significant.

Alternative 1 does not cross as many parcels because it routes the new storm sewer down the local streets. Working in customers' yards and close proximity to their homes introduces many potential delays. Therefore, after careful consideration, the schedule and public effects outweigh the cost savings. GRW recommends the LFUCG to proceed with final design of Alternative 1.

Table 6
Recommended Alternative

	Alternative 1
Project Description	Pipes & Inlets, reroute in street
Number of ERUs mitigated	6
Property Damage	*Some damage reported*
Frequency	*Frequency about 1 per year*
Number of Easements	0
Utility Relocation	unknown
Cost in thousands, K	$706K
Cost/ERU Mitigated	$118K

8. REFERENCES

Lexington-Fayette Urban County Government. 2009. Stormwater Manual. *With amendments*.

National Resources Conservation Service. 2011. Web Soil Survey.

U.S. Department of Agriculture. 1996. Urban Hydrology for Small Watersheds. Technical Release 55 (TR-55).

9. EXHIBITS

Exhibit 1

Site Topography

Exhibit 2

Flood Area and Existing Infrastructure

Exhibit 3

Drainage Areas

Exhibit 4

Alternative 1: New Pipes on New Alignment

Exhibit 5

Alternative 2: Larger Pipes on Same Alignment

Exhibit 6

Flooded Homes

10. APPENDICES

Appendix A

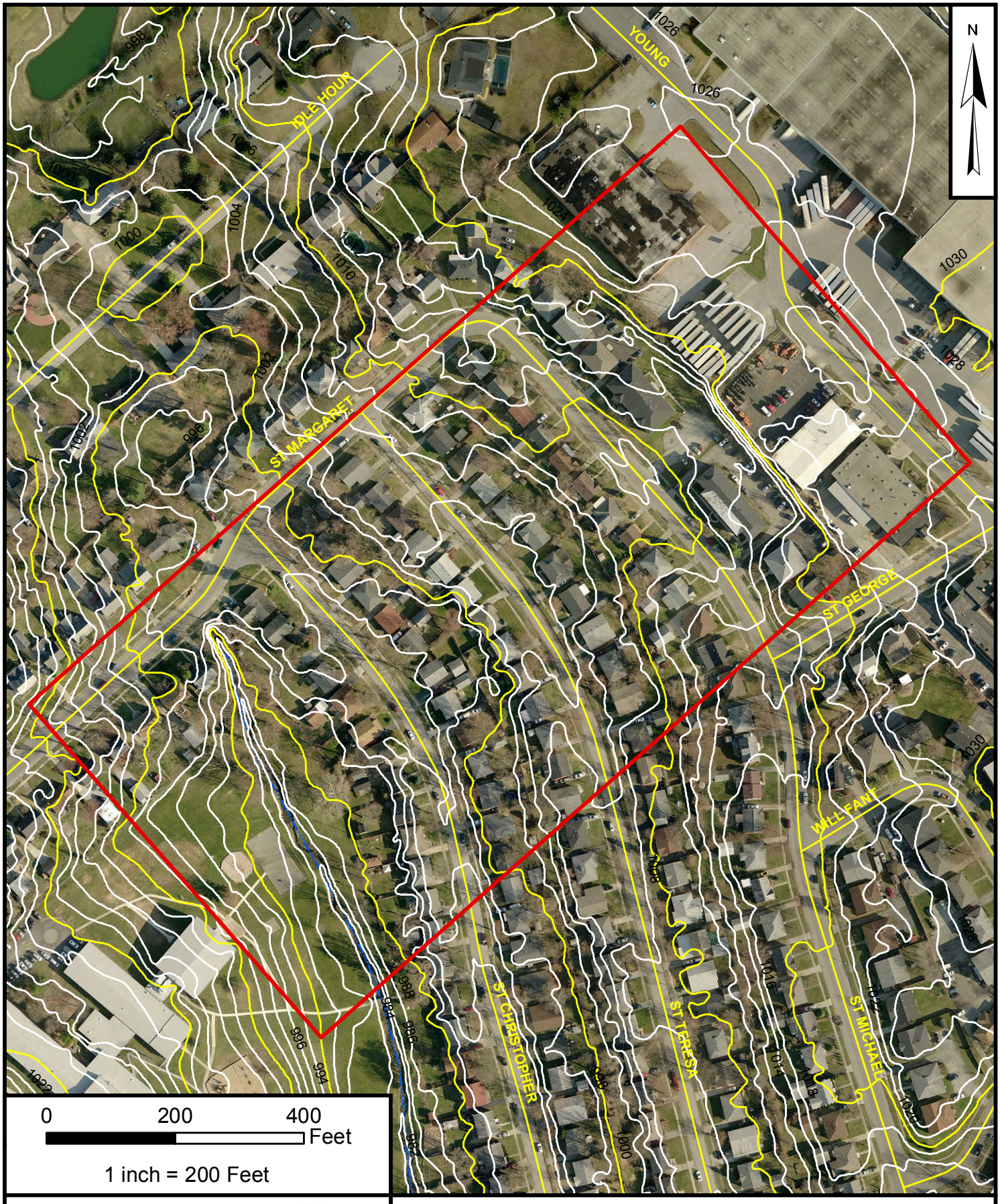
Survey Data

Appendix B

2002 Questionnaires

Appendix C

Opinion of Probable Cost



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FAYETTE URBAN COUNTY GOVERNMENT LEXINGTON KENTUCKY 1775

Exhibit 1
Site Topography
Idle Hour North Project Area
Lexington, Kentucky

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FAYETTE URBAN COUNTY GOVERNMENT LEXINGTON KENTUCKY 1775

Exhibit 2
Flood Area
Idle Hour North Project Area
Lexington, Kentucky

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Exhibit 3
Drainage Areas
Idle Hour North Project Area
Lexington, Kentucky

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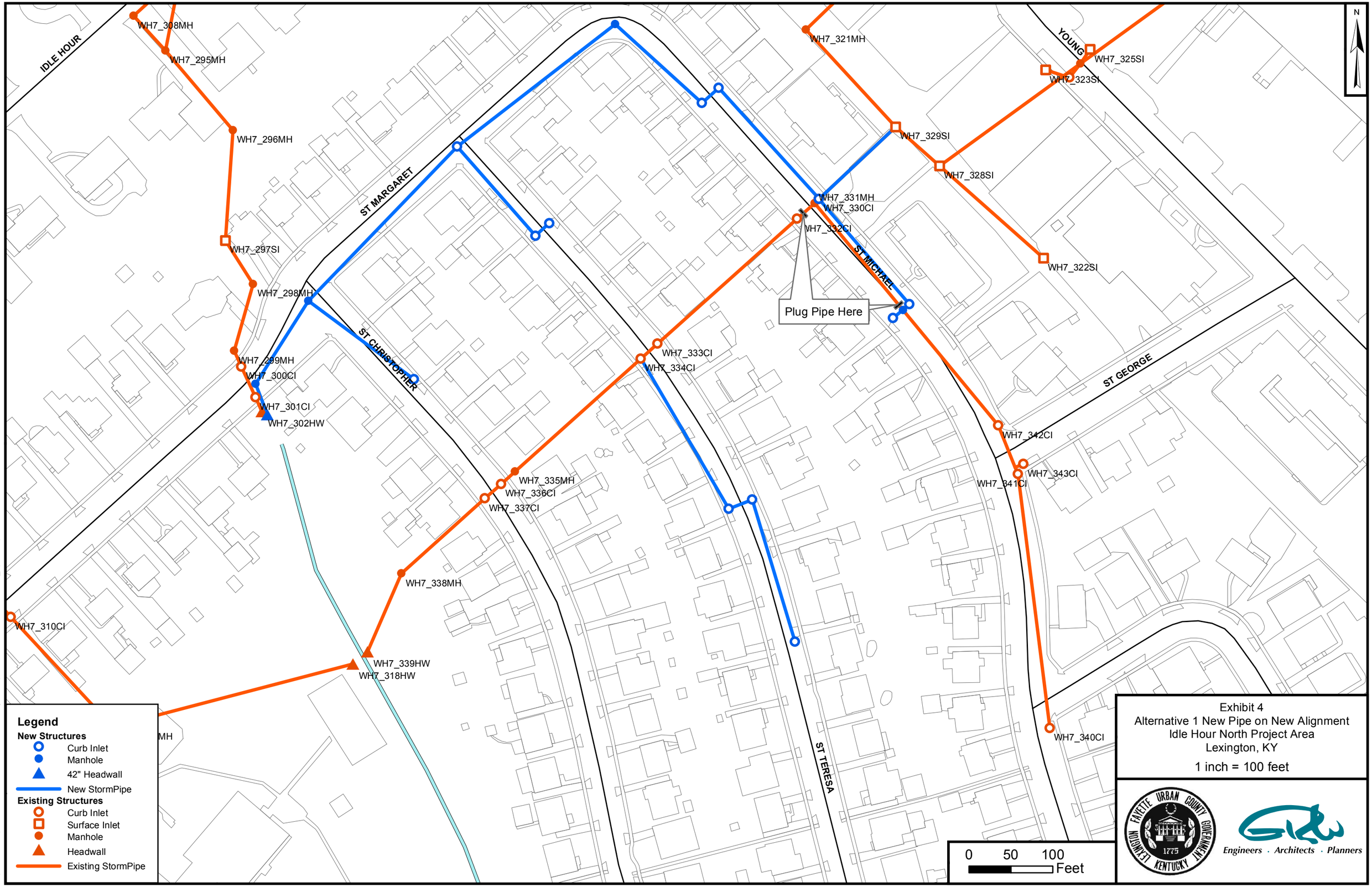

Legend

New Structures
- Curb Inlet
- Manhole
- 42" Headwall
- New StormPipe

Existing Structures
- Curb Inlet
- Surface Inlet
- Manhole
- Headwall
- Existing StormPipe

Exhibit 4
Alternative 1 New Pipe on New Alignment
Idle Hour North Project Area
Lexington, KY

1 inch = 100 feet

LEXINGTON FAYETTE URBAN COUNTY GOVERNMENT 1775 KENTUCKY

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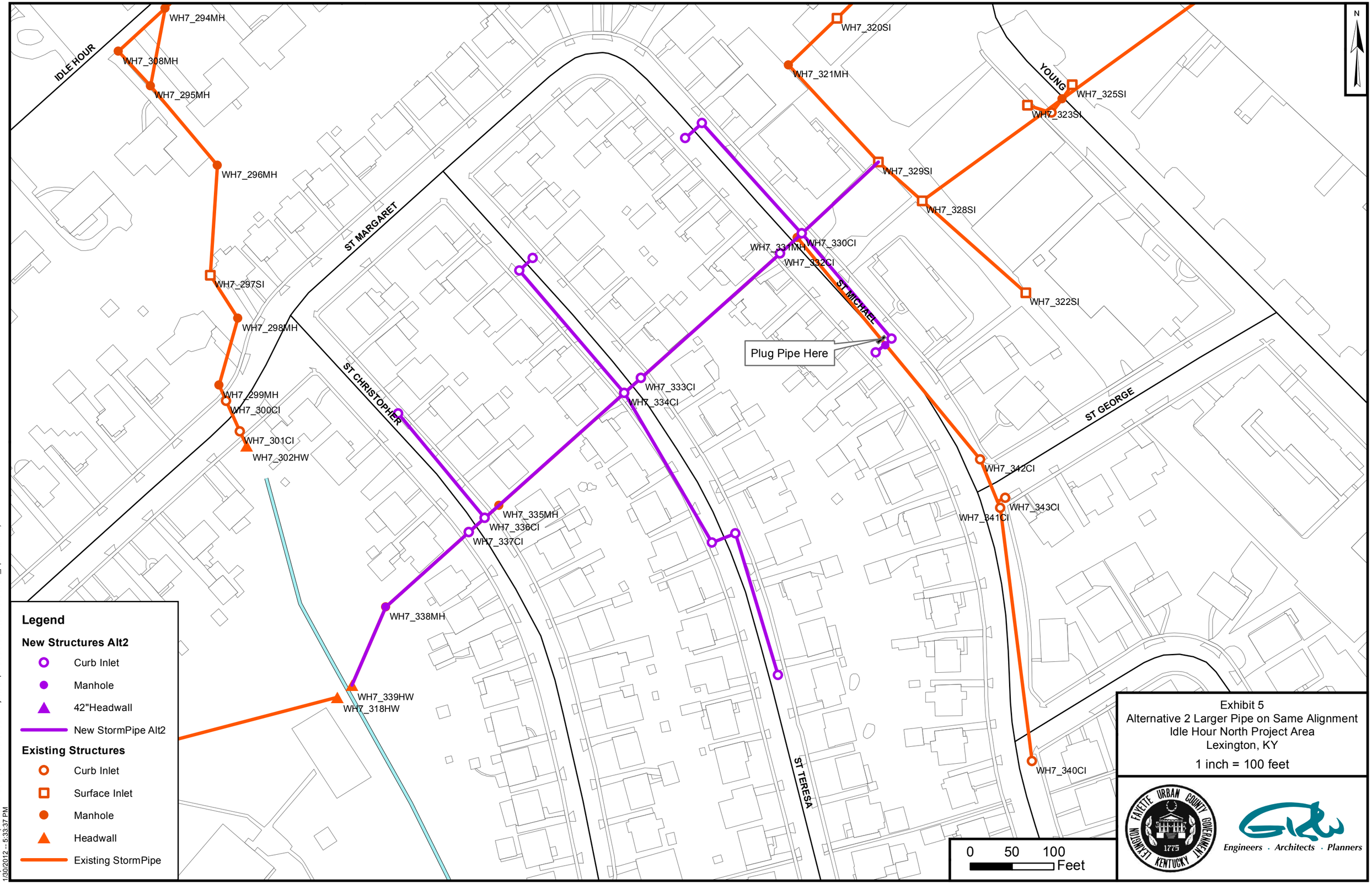

Legend

New Structures Alt2

- Curb Inlet
- Manhole
- 42"Headwall
- New StormPipe Alt2

Existing Structures

- Curb Inlet
- Surface Inlet
- Manhole
- Headwall
- Existing StormPipe

Exhibit 5
Alternative 2 Larger Pipe on Same Alignment
Idle Hour North Project Area
Lexington, KY

1 inch = 100 feet

LEXINGTON FAYETTE URBAN COUNTY GOVERNMENT KENTUCKY 1775

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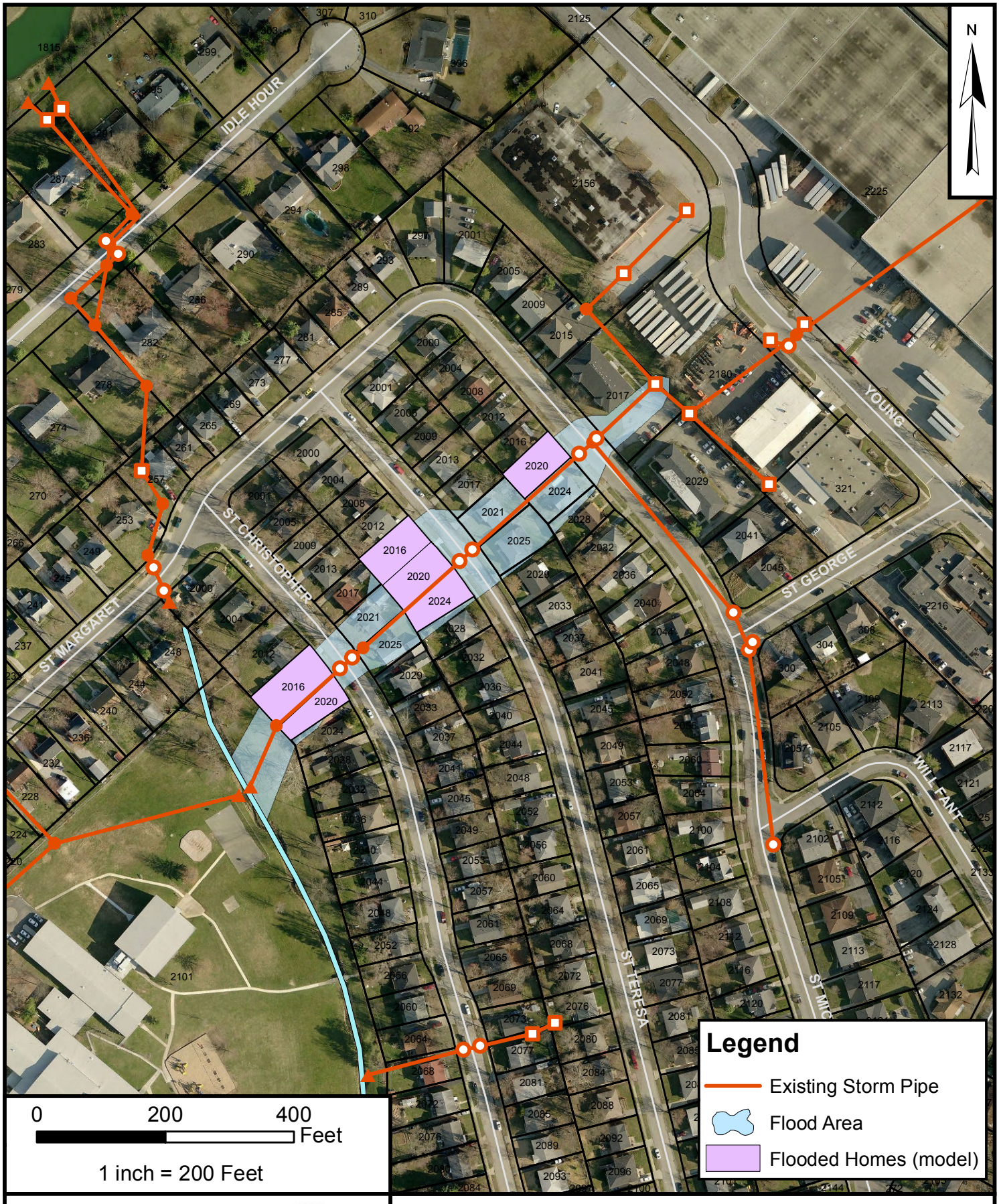

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Exhibit 6
Alternative 3 Purchase Flooded Homes
Idle Hour North Project Area
Lexington, Kentucky

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APPENDIX A

SURVEY DATA

HALL-HARMON ENGINEERS, INC.
Lexington, Kentucky

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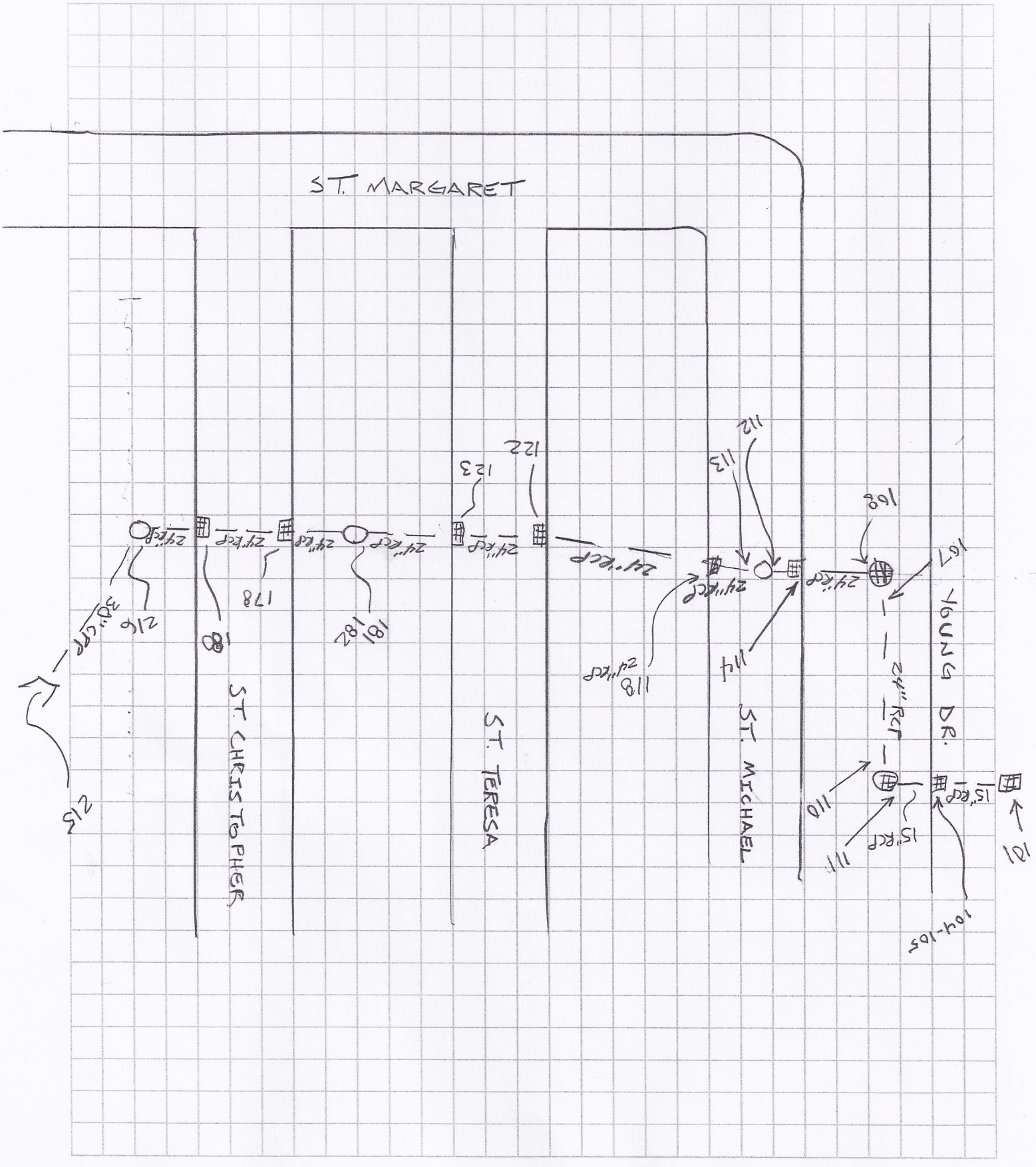
Computed By	
Checked By	Clay Tackett

Project IDLE HOUR STORM Location LEX.

Subject STORM SEWER



GRW Pt	Northing	Easting			GroundElevation	Invert In	Invert Out	Pipe Out
100	191852.8582	1580692.161	WH7_325SI	SI 1 Young Drive	1021.026		1018.427	15-in
103	191827.1135	1580664.515		SI	1020.48	1018.007	1018.103	
106	191761.7177	1580461.485		SI	1012.136	1003.58	1003.573	
109	191714.45	1580514.201		SI btw Young and St Mich	1012.818			
110	191714.8631	1580512.262		INV-24IN-RCP	1004.947			
111	191714.0621	1580514.824		INV-15IN-RCP	1004.865			
112	191673.6248	1580364.037		INV-24IN-RCP	1001.628			
113	191672.6445	1580363.474		INV-24IN-RCP	1001.634			
114	191678.0051	1580368.925		INV-24IN-RCP	1001.828			
118	191655.222	1580343.433		INV-24IN-RCP	1001.493			
122	191504.0461	1580174.984		INV-24IN-RCP	996.929			
123	191486.6938	1580155.179		INV-24IN-RCP	996.357			
177	191336.3305	1579989.022		SI St Christopher E	993.177		989.559	
179	191318.92	1579969.478		SI St Christopher W	993.398		989.886	
181	191350.4002	1580003.789		INV-24IN-RCP	990.181			
182	191351.2092	1580005.118		INV-24IN-RCP	990.166			
116	191673.1553	1580363.507		MH	1007.864			
102	191840.2805	1580679.489		MH SANITARY	1021.322			
216	191230.9116	1579871.565		MH STORM	991.158			
217	191350.0379	1580005.069		MH STORM	994.783			
106	191761.7177	1580461.485		SI	1012.136			
115	191677.9529	1580368.911		SI	1006.923			
117	191655.1609	1580343.437		SI	1006.975			
121	191504.0563	1580174.973		SI	1001.749			
124	191486.8837	1580155.41		SI	1001.6			
215	191136.5952	1579828.228		HW INV-30IN-CPP	984.822			
188	191267.6258	1579754.923		TOB	988.412			
191	191280.3471	1579771.173		TOB	988.936			
196	191148.5621	1579824.766		TOB	988.625			
200	191130.1795	1579835.696		TOB	986.924			
206	191118.785	1579810.43		TOB	987.555			
210	190960.6856	1579925.033		TOB	985.315			
213	190953.0946	1579911.415		TOB	985.261			
189	191270.0274	1579760.133		FL	985.27			
190	191272.5681	1579766.995		FL	984.961			
197	191145.6786	1579819.284		FL	984.191			
198	191136.3013	1579821.934		FL	984.227			
201	191128.0925	1579832.106		FL	983.919			
202	191110.6581	1579832.883		FL	984.054			
203	191108.4754	1579826.496		FL	984.056			
205	191120.0393	1579816.08		FL	984.757			
207	191133.0399	1579813.679		FL	985.052			
211	190958.0892	1579921.728		FL	983.365			
212	190954.1602	1579913.915		FL	982.717			
187	191244.3361	1579726.257		GRND	990.919			
192	191296.8173	1579795.899		GRND	990.472			
193	191195.3448	1579883.64		GRND	990.742			
194	191180.0906	1579865.03		GRND	990.721			
195	191163.3908	1579843.875		GRND	989.333			
199	191140.7106	1579856.754		GRND	988.983			
208	191104.0679	1579791.931		GRND	988.73			
209	190966.8405	1579940.07		GRND	987.634			
214	190937.1136	1579886.989		GRND	985.763			

APPENDIX B

QUESTIONNAIRES 2002

Shaping Our Community

ENGINEERING

Resident Questionnaire
Idle Hour North
Stormwater Drainage Issues

(Please complete and return in the enclosed stamped envelope as soon as possible.)

First Name: GEORGE Last Name: Bush

Street Address (specify if mailing address is different):
2016 St. Christopher Drive

City: LEXINGTON State: Ky Zip: 40502

Telephone: Work: ( ) Home: ( ) 266-5836

General Information:

1. How long have you lived at this address? 39 YRS.
2. Has your property suffered flooding in the past? Yes ☑ No ☐

If Yes,....

3. What were the limits of flooding? (check all that apply)
   In Yard Yes ☑ No ☐
   In Street Yes ☑ No ☐
   In House Yes ☑ No ☐
4. In the last ten years, how many times has your property flooded to some extent?
   1 time: ☐ 2 times: ☐ 5 times: ☐ 10 or more times: ☑
5. When did the worst stormwater flooding event occur? Month:_____ Year:_____
6. If you can recall, how many inches of rain fell during this storm event?_____
7. During this event, how long did it take for the water to drain after the highest level was reached?
   4 hours: ☑ 12 Hours: ☐ 1 day: ☐ 2 days or more: ☐
8. After this event, how long did water stand in.....
   streets?: 4 hours: ☑ 12 hours: ☐ 1 day: ☐ 2 days or more: ☐
   yard?: 4 hours: ☑ 12 hours: ☐ 1 day: ☐ 2 days or more: ☐
9. Do you have any photographs or videos of your flooding property or neighborhood?
   Yes ☐ No ☑ Neighbor Has Video.

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10. If yes, would you allow us to review and copy these photos and/or videos?
Yes ☐ No ☐

11. Are storm drains or ditches located on your property? Yes ☑ No ☐

12. Are there existing drainage easements on your property? Yes ☐ No ☐

13. Have you observed stream flooding in the vicinity of your house? Yes ☑ No ☐

14. If yes, how many times each year? 2-3

15. Have you ever observed manholes overflowing in the vicinity of your house?
Yes ☑ No ☐

• 16. Have you contacted LFUCG previously about this problem? Yes ☑ No ☐
If yes, when: SEVERAL TIMES EACH COME OUT TALKED TO US
Who did you speak with _____

17. Has any activity such as new construction, landscape, etc. occurred over the years that may have caused or increased your drainage problem? Yes ☐ No ☑
If yes, describe

_____

_____

_____

_____

18. Do you have a sump pump? Yes ☑ No ☐

19. Where does the sump pump discharge? Yard ☑ Storm Sewer ☐
Sanitary Sewer ☐ Not Sure ☐
If other, please describe _____

20. Have you experienced any sanitary sewer backups? Yes ☑ No ☐

21. Have you noticed sanitary sewer odors during flooding events? Yes ☑ No ☐

Structural Flooding:

If water entered your house…..

• 22. What area of your house flooded?
Basement: ☑ Crawl Space ☐ First Floor ☐ Garage ☑

23. How did it enter?

Through door:	☑	Through walls and/or cracks:	☐
Through window:	☑	Sewer back-up (through toilet/sinks):	☐
Floor drain:	☑	Other: _____	☐

Please review the drawing on the attached sheet and sketch where flooding occurred and where and how it entered the house.

Flooding Sketch:

The drawing on the following sheet is a picture of the general area in which we believe you property is located. On the drawing please locate your house by the street address number and follow the instructions on how to sketch you flooding problems.

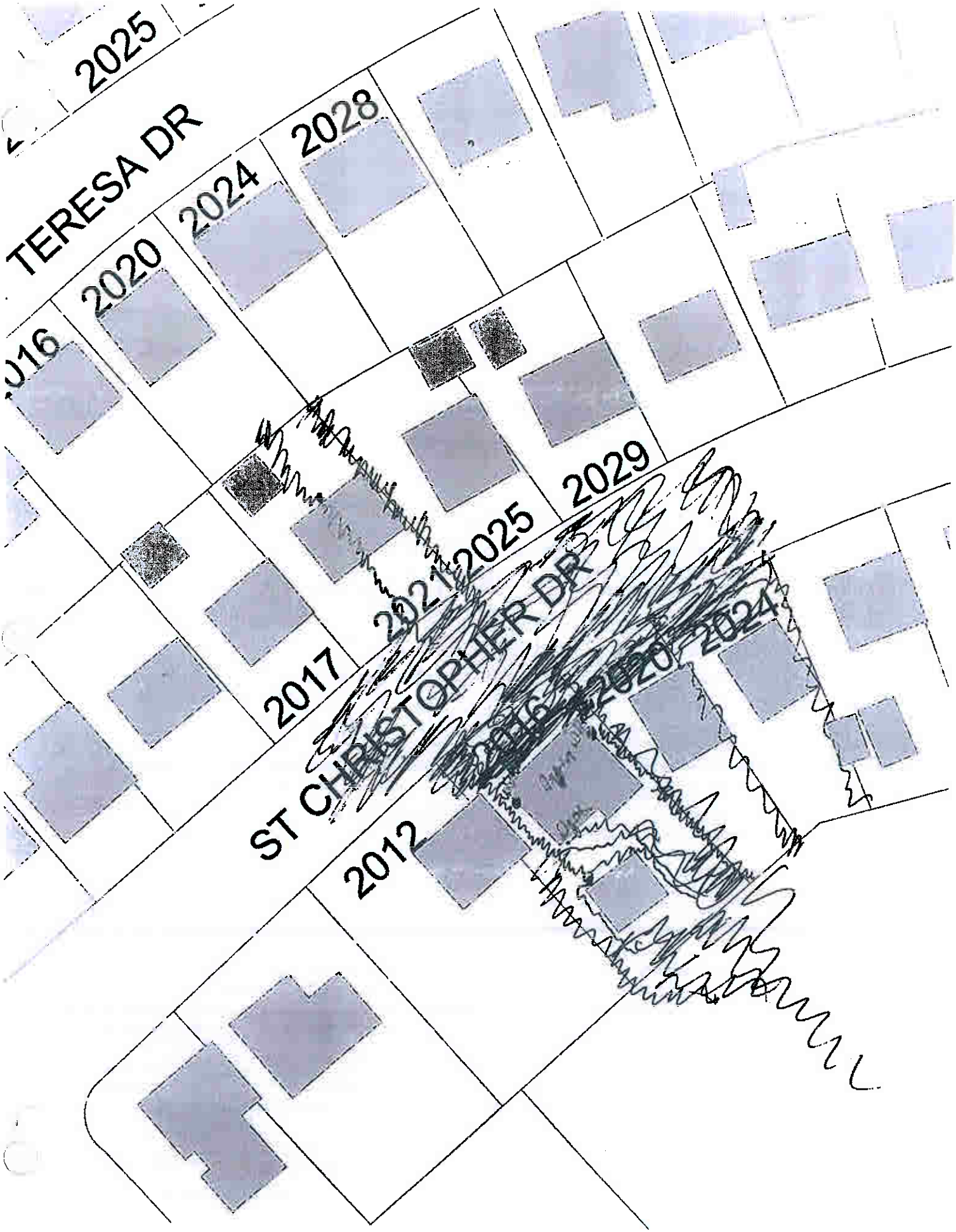
1. Outline and shade in the areas on your property and the adjacent properties where you recall flooding to have occurred during the worst storm event you can remember.
2. If stormwater entered your house, please place a big dot or star where you believe the water entered your house and name the "opening" through which it came (i.e. basement window, back basement door, floor drain, etc.....)

Remember to sketch....

where the highest level to which water has flooded on your property is located?
Please refer to a fixed object like a tree or part of the house and indicate how high the water rose (i.e. "The water was 2" deep on the big tree in my back yard.").

Briefly describe drainage problems: WATER COMES up out of DRAIN ON other side of STREET RUNS ACROSS GOES DOWN DRAIN ON my side of street UNTIL WATER RUNS down BETWEEN HOUSES ACROSS THE STREET THEN My Side CAN Not HANDLE AND BACKS up. Floods the STREET 3 to 4 feet DEEP RUNS DOWN BOTH SIDES of my house 5 to 6 inches DEEP, CAME in BASEMENT Windows & DOOR RUNS 5'4 to 6" ACROSS BACKyARD

THANK YOU FOR YOU TIME!


2025
TERESA DR
2028
2024
2020
016
2029
2021
2025
ST CHRISTOPHER DR
2017
2016
2020
2024
2012

Shaping Our Community

ENGINEERING

Resident Questionnaire
Idle Hour North
Stormwater Drainage Issues

(Please complete and return in the enclosed stamped envelope as soon as possible.)

First Name: Lindsey JOE Last Name: Borders

Street Address (specify if mailing address is different):
2017 St. Christopher Dr.

City: Lexington State: Ky. Zip: 40502

Telephone: Work:( ) X Home: 859 266-4893

General Information:

1. How long have you lived at this address? _____

2. Has your property suffered flooding in the past? Yes ☑ No ☐

If Yes,....

3. What were the limits of flooding? (check all that apply)
   In Yard Yes ☑ No ☐
   In Street Yes ☑ No ☐
   In House Yes ☐ No ☐

4. In the last ten years, how many times has your property flooded to some extent?
   1 time: ☐ 2 times: ☑ 5 times: ☐ 10 or more times: ☐

5. When did the worst stormwater flooding event occur? Month: 6 Year: 02

6. If you can recall, how many inches of rain fell during this storm event? NO

7. During this event, how long did it take for the water to drain after the highest level was reached?
   4 hours: ☑ 12 Hours: ☐ 1 day: ☐ 2 days or more: ☐

8. After this event, how long did water stand in.....
   streets?: 4 hours: ☑ 12 hours: ☐ 1 day: ☐ 2 days or more: ☐
   yard?: 4 hours: ☐ 12 hours: ☐ 1 day: ☐ 2 days or more: ☐

9. Do you have any photographs or videos of your flooding property or neighborhood?
   Yes ☑ No ☐

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10. If yes, would you allow us to review and copy these photos and/or videos?
Yes ☑ No ☐

11. Are storm drains or ditches located on your property? Yes ☐ No ☑

12. Are there existing drainage easements on your property? Yes ☐ No ☑

13. Have you observed stream flooding in the vicinity of your house? Yes ☑ No ☐

14. If yes, how many times each year? 3

15. Have you ever observed manholes overflowing in the vicinity of your house?
Yes ☑ No ☐

16. Have you contacted LFUCG previously about this problem? Yes ☐ No ☑
If yes, when: _____
Who did you speak with _____

17. Has any activity such as new construction, landscape, etc. occurred over the years that may have caused or increased your drainage problem? Yes ☐ No ☑
If yes, describe
_____
_____
_____
_____

18. Do you have a sump pump? Yes ☐ No ☑

19. Where does the sump pump discharge? Yard ☐ Storm Sewer ☐
Sanitary Sewer ☐ Not Sure ☐
If other, please describe _____

20. Have you experienced any sanitary sewer backups? Yes ☐ No ☑

21. Have you noticed sanitary sewer odors during flooding events? Yes ☐ No ☑

Structural Flooding:

If water entered your house.....

22. What area of your house flooded?
Basement: ☐ Crawl Space ☐ First Floor ☐ Garage ☑

23. How did it enter?
Through door: ☐ Through walls and/or cracks: ☑
Through window: ☐ Sewer back-up (through toilet/sinks): ☐
Floor drain: ☐ Other: _____ ☐

Please review the drawing on the attached sheet and sketch where flooding occurred and where and how it entered the house.

Flooding Sketch:

The drawing on the following sheet is a picture of the general area in which we believe you property is located. On the drawing please locate your house by the street address number and follow the instructions on how to sketch you flooding problems.

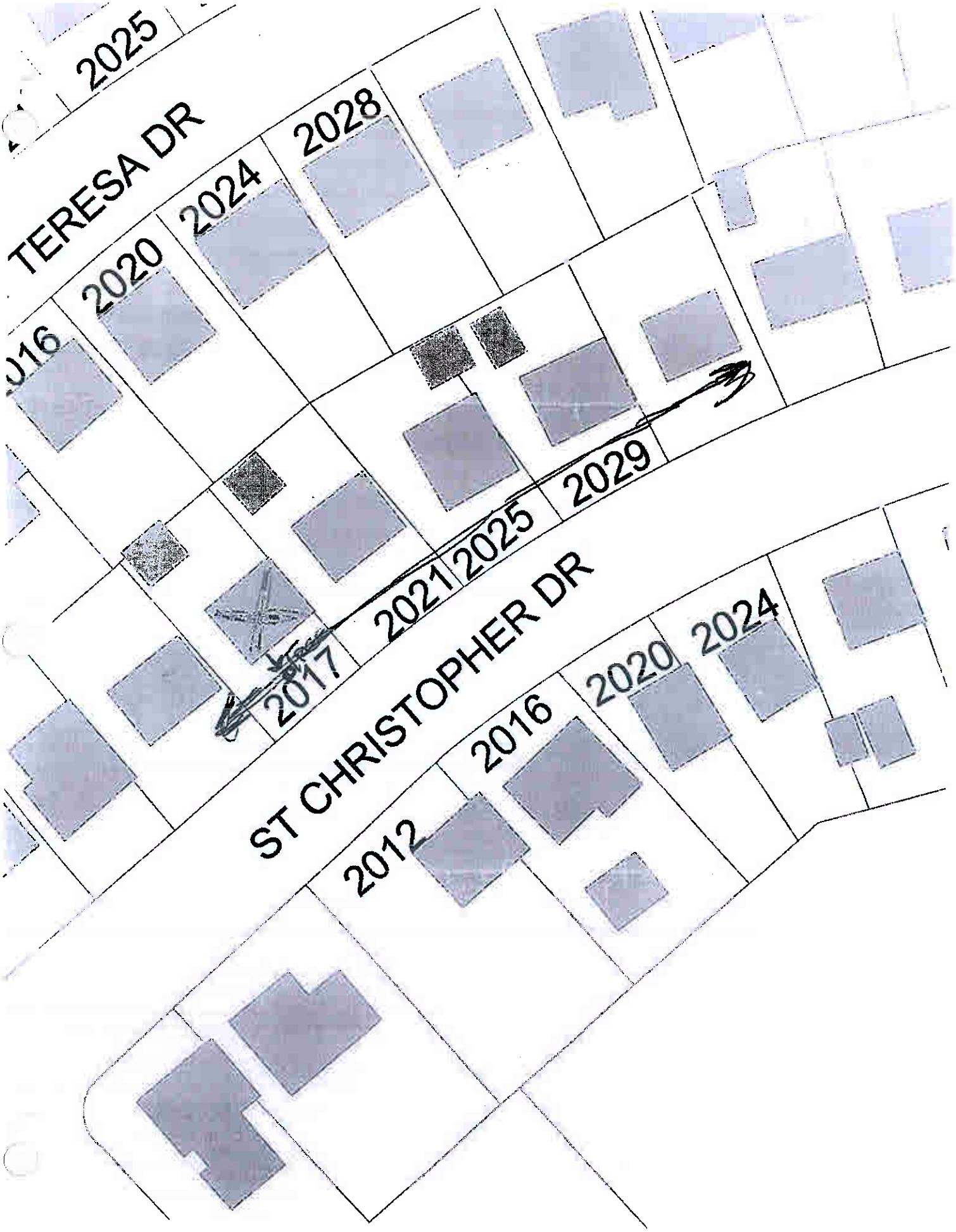
1. Outline and shade in the areas on your property and the adjacent properties where you recall flooding to have occurred during the worst storm event you can remember.
2. If stormwater entered your house, please place a big dot or star where you believe the water entered your house and name the "opening" through which it came (i.e. basement window, back basement door, floor drain, etc.....)

Remember to sketch....

where the highest level to which water has flooded on your property is located?
Please refer to a fixed object like a tree or part of the house and indicate how high the water rose (i.e. "The water was 2" deep on the big tree in my back yard.").

Briefly describe drainage problems: Water Back up to my big tree And About 3' Past It. I was concerned About water coming into my back yard into my kitchen And it was About one inch Away from coming in.

THANK YOU FOR YOU TIME!


2025
TERESA DR
2028
2024
2020
016
2029
2025
2021
2017
ST CHRISTOPHER DR
2024
2020
2016
2012

Shaping Our Community

ENGINEERING

Resident Questionnaire
Idle Hour North
Stormwater Drainage Issues

(Please complete and return in the enclosed stamped envelope as soon as possible.)

First Name: MARY Last Name: SHELDON

Street Address (specify if mailing address is different):
2020 ST. CHRISTOPHER DR

City: LEXINGTON State: KY Zip: 40502

Telephone: Work: ( ) 268-2643 Home: ( ) 268-7854

General Information:

1. How long have you lived at this address? 9 yrs.
2. Has your property suffered flooding in the past? Yes ☑ No ☐

If Yes,....

3. What were the limits of flooding? (check all that apply)
   In Yard Yes ☑ No ☐
   In Street Yes ☑ No ☐
   In House Yes ☑ No ☐
4. In the last ten years, how many times has your property flooded to some extent?
   1 time: ☐ 2 times: ☐ 5 times: ☑ 10 or more times: ☐
5. When did the worst stormwater flooding event occur? Month: 7 Year: ALL YEARS
6. If you can recall, how many inches of rain fell during this storm event? 2-3
7. During this event, how long did it take for the water to drain after the highest level was reached?
   4 hours: ☑ 12 Hours: ☐ 1 day: ☐ 2 days or more: ☐
8. After this event, how long did water stand in.....
   streets?: 4 hours: ☑ 12 hours: ☐ 1 day: ☐ 2 days or more: ☐
   yard?: 4 hours: ☑ 12 hours: ☐ 1 day: ☐ 2 days or more: ☐
9. Do you have any photographs or videos of your flooding property or neighborhood?
   Yes ☑ No ☐

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Please review the drawing on the attached sheet and sketch where flooding occurred and where and how it entered the house.

Flooding Sketch:

The drawing on the following sheet is a picture of the general area in which we believe you property is located. On the drawing please locate your house by the street address number and follow the instructions on how to sketch you flooding problems.

1. Outline and shade in the areas on your property and the adjacent properties where you recall flooding to have occurred during the worst storm event you can remember.
2. If stormwater entered your house, please place a big dot or star where you believe the water entered your house and name the "opening" through which it came (i.e. basement window, back basement door, floor drain, etc.....)

Remember to sketch....

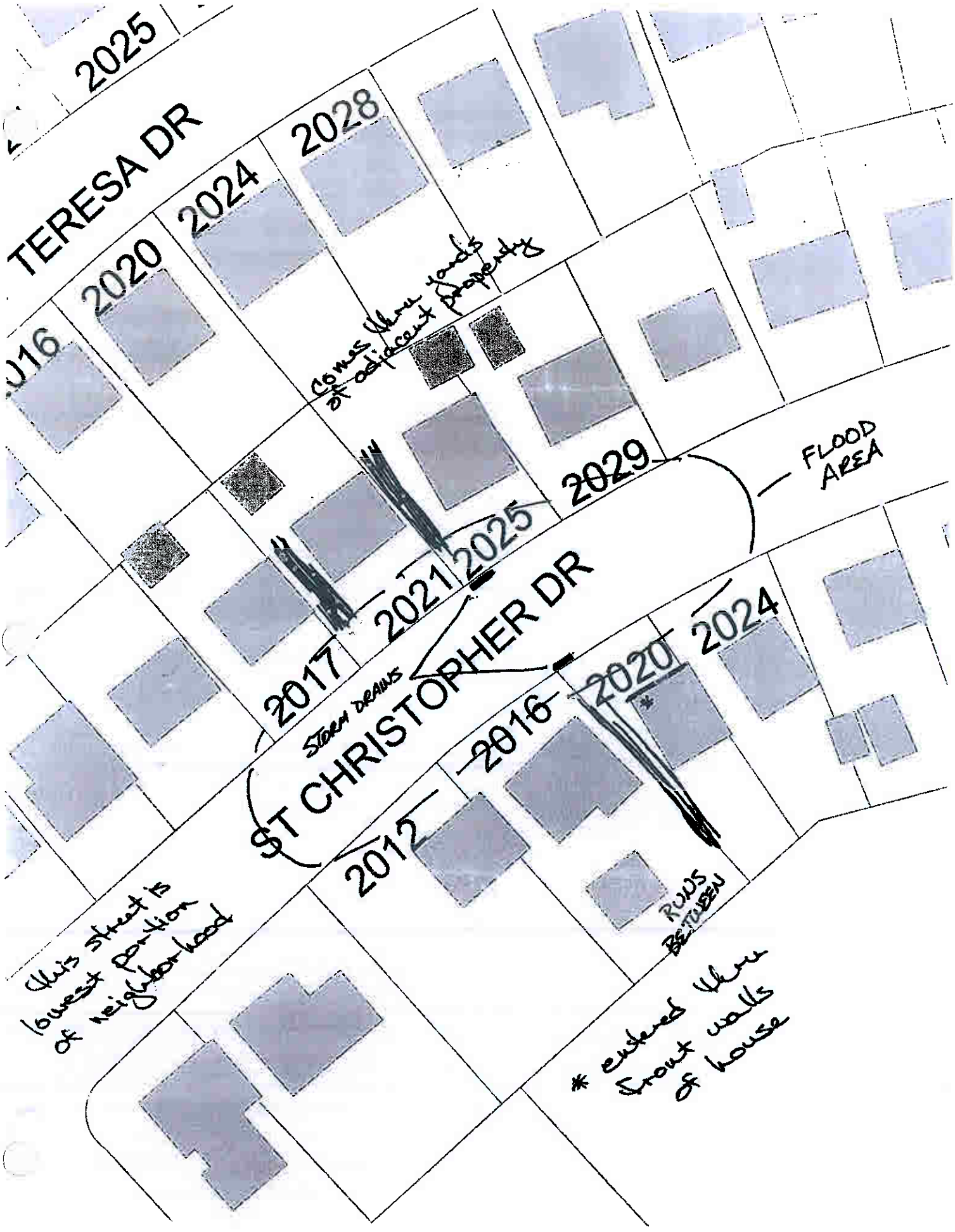
where the highest level to which water has flooded on your property is located?
Please refer to a fixed object like a tree or part of the house and indicate how high the water rose (i.e. "The water was 2" deep on the big tree in my back yard.").

Briefly describe drainage problems:

The storm drains empty into a creek behind my property. These storm drains are angled into the creek bed. A simple excavation of the creek bed would go a long way to solving this habitual problem.

We have numerous pictures and videos which the neighborhood is considering sending to the News media. We have been requesting assistance with this problem for several years.

THANK YOU FOR YOU TIME!


2025
TERESA DR
2028
2024
2020
U16
Comes thru yards of adjacent property
2029
FLOOD AREA
2025
2021
2017
Storm drains
ST CHRISTOPHER DR
2024
2020
2016
2012
*
This street is lowest portion of neighborhood
RUNS BETWEEN
* entered thru front walls of house

Shaping Our Community

ENGINEERING

Resident Questionnaire
Idle Hour North
Stormwater Drainage Issues

(Please complete and return in the enclosed stamped envelope as soon as possible.)

First Name: Della Last Name: Herndon

Street Address (specify if mailing address is different):
2025 St Christopher Dr

City: Lexington State: KY Zip: 40502

Telephone: Work: ( ) 859-269-5396 Home: ( ) 859-266-0806

General Information:

1. How long have you lived at this address? 37 yrs
2. Has your property suffered flooding in the past? Yes ☒ No ☐

If Yes,....

3. What were the limits of flooding? (check all that apply)
   In Yard Yes ☒ No ☐
   In Street Yes ☒ No ☐
   In House Yes ☐ No ☒
4. In the last ten years, how many times has your property flooded to some extent?
   1 time: ☐ 2 times: ☐ 5 times: ☐ 10 or more times: ☒
5. When did the worst stormwater flooding event occur? Month: _____ Year: don't remem
6. If you can recall, how many inches of rain fell during this storm event? don't remember
7. During this event, how long did it take for the water to drain after the highest level was reached?
   4 hours: ☐ 12 Hours: ☐ 1 day: ☐ 2 days or more: ☐
8. After this event, how long did water stand in.....
   streets?: 4 hours: ☐ 12 hours: ☐ 1 day: ☐ 2 days or more: ☐ don't kno
   yard?: 4 hours: ☐ 12 hours: ☐ 1 day: ☐ 2 days or more: ☐
9. Do you have any photographs or videos of your flooding property or neighborhood?
   Yes ☐ No ☒

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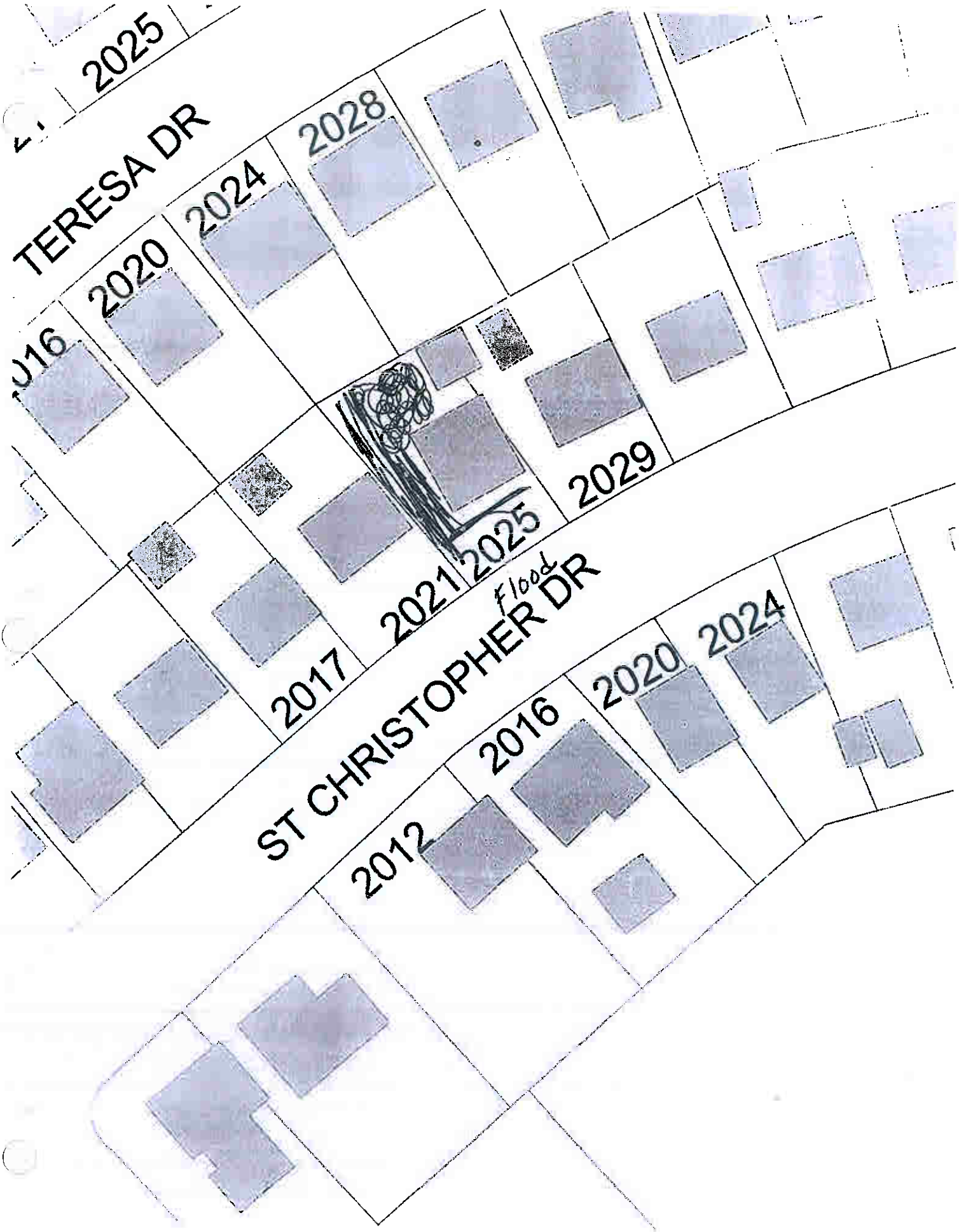
2025
TERESA DR
2028
2024
2020
016
2029
2025
2021
Flood
DR
ST CHRISTOPHER
2017
2024
2020
2016
2012

Shaping Our Community

Resident Questionnaire
Idle Hour North
Stormwater Drainage Issues

(Please complete and return in the enclosed stamped envelope as soon as possible.)

First Name: ANN Last Name: CUMMINS

Street Address (specify if mailing address is different):
2024 St. Michael Dr.

City: LEXINGTON State: Ky. Zip: 40502

Telephone: Work: 859-255-1551 Home: 859 269-7247

General Information:

1. How long have you lived at this address? 4 yrs. 3 mo.
2. Has your property suffered flooding in the past? Yes ☑ No ☐

If Yes,....

3. What were the limits of flooding? (check all that apply)
   - In Yard: Yes ☑ No ☐
   - In Street: Yes ☑ No ☐
   - In House: Yes ☐ No ☑
4. In the last ten years, how many times has your property flooded to some extent?
   1 time: ☐ 2 times: ☐ 5 times: ☑ 10 or more times: ☐
5. When did the worst stormwater flooding event occur? Month: Aug. Year: '02'
6. If you can recall, how many inches of rain fell during this storm event? 3 OR 4 in 1 hr. IN less than an hour.
7. During this event, how long did it take for the water to drain after the highest level was reached?
   4 hours: ☐ 12 Hours: ☐ 1 day: ☐ 2 days or more: ☐
   About an Hour
8. After this event, how long did water stand in.....
   streets?: 4 hours: ☐ 12 hours: ☐ 1 day: ☐ 2 days or more: ☐
   yard?: 4 hours: ☐ 12 hours: ☐ 1 day: ☐ 2 days or more: ☐
   About an hour
9. Do you have any photographs or videos of your flooding property or neighborhood?
   Yes ☐ No ☑ People in the neighborhood took pictures.

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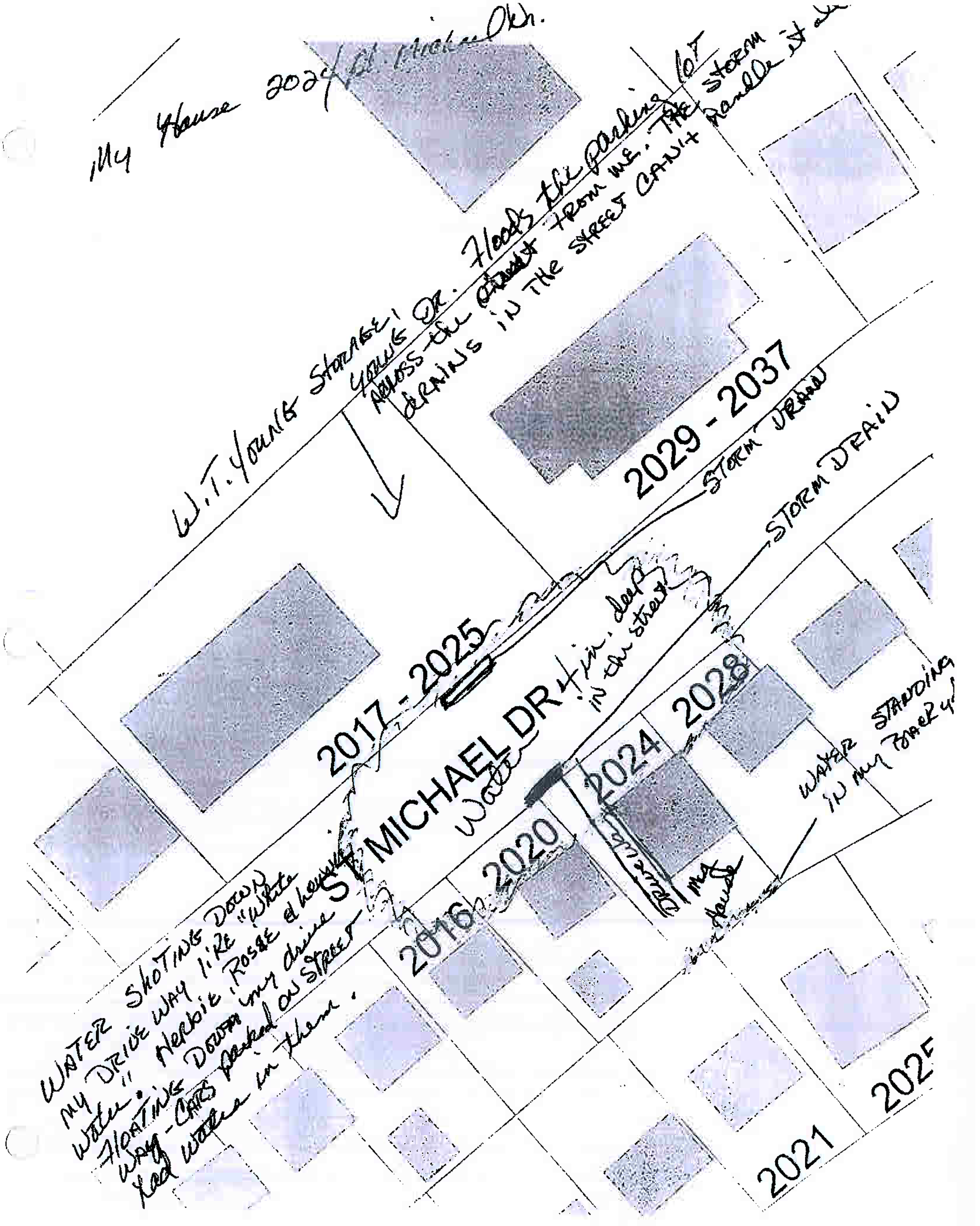
My House 2024 St. Michael Dr.
W.T. YOUNG STORAGE! YOUNG DR. Floods the parking lot ACROSS the street FROM ME. THE storm drains IN THE STREET CAN'T handle it
2029 - 2037
STORM DRAIN
STORM DRAIN
2017 - 2025
ST MICHAEL DR
4 in. deep IN the street
Water
2028
2024
2020
2016
Drive way
My house
WATER STANDING IN MY BACK YARD
WATER SHOTING DOWN MY DRIVE WAY LIKE "White water" HERBIE, ROSIE & house FLOATING DOWN my drive way - CARS parked ON STREET had water in them.
2021
2025

Shaping Our Community

ENGINEERING

Resident Questionnaire
Idle Hour North
Stormwater Drainage Issues

(Please complete and return in the enclosed stamped envelope as soon as possible.)

First Name: Ken + Lyra Last Name: Moore

Street Address (specify if mailing address is different):
2020 ST. michael Dr.

City: Lexington State: Ky Zip: 40502

Telephone: Work: (859) 260-2100 Home: (859) 266-4157

General Information:

1. How long have you lived at this address? 16 years

2. Has your property suffered flooding in the past? Yes ☒ No ☐

If Yes,....

3. What were the limits of flooding? (check all that apply)
   In Yard Yes ☒ No ☐
   In Street Yes ☒ No ☐
   In House Yes ☒ No ☐

4. In the last ten years, how many times has your property flooded to some extent?
   1 time: ☐ 2 times: ☒ 5 times: ☒ 10 or more times: ☐

5. When did the worst stormwater flooding event occur? Month: July Year: 3 1998

6. If you can recall, how many inches of rain fell during this storm event? ≤ 1"

7. During this event, how long did it take for the water to drain after the highest level was reached?
   4 hours: ☒ 12 Hours: ☐ 1 day: ☐ 2 days or more: ☐

8. After this event, how long did water stand in.....
   streets?: 4 hours: ☒ 12 hours: ☐ 1 day: ☐ 2 days or more: ☐
   yard?: 4 hours: ☒ 12 hours: ☐ 1 day: ☐ 2 days or more: ☐

9. Do you have any photographs or videos of your flooding property or neighborhood?
   Yes ☐ No ☒

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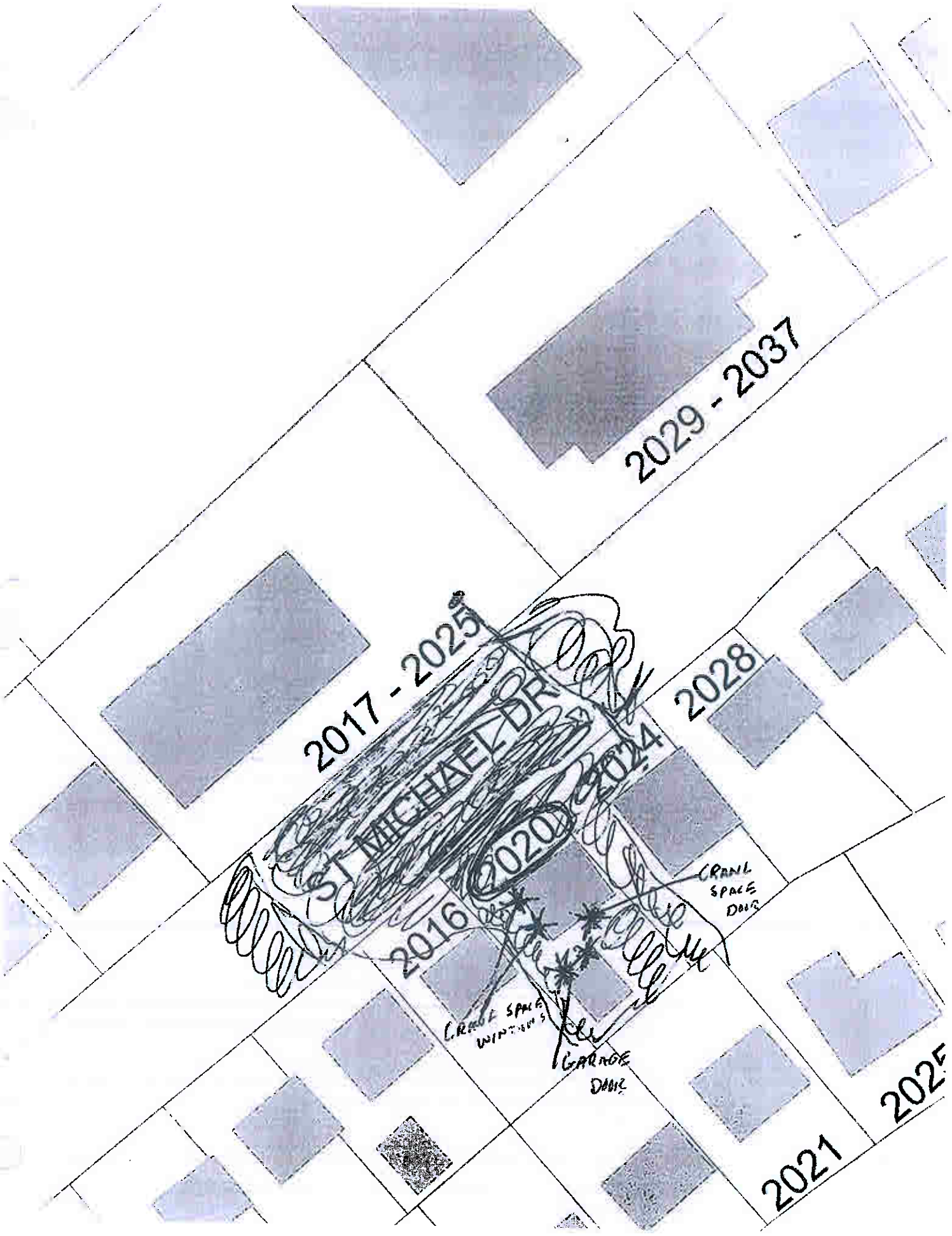
2029 - 2037
2017 - 2025
ST MICHAEL DR
2028
2016
2020
2024
CRAWL SPACE DOOR
CRAWL SPACE WINDOWS
GARAGE DOOR
2021
202

Shaping Our Community

ENGINEERING

Resident Questionnaire
Idle Hour North
Stormwater Drainage Issues

(Please complete and return in the enclosed stamped envelope as soon as possible.)

First Name: SANDERS Last Name: Thomas & Barbara

Street Address (specify if mailing address is different):
2012 St. Teresa Dr.

City: LEX State: KY Zip: 40502

Telephone: Work:( ) — Home: 859 268-6038

General Information:

1. How long have you lived at this address? 18 YEARS
2. Has your property suffered flooding in the past? Yes ☑ No ☐

If Yes,....

3. What were the limits of flooding? (check all that apply)
   In Yard Yes ☑ No ☐
   In Street Yes ☑ No ☐
   In House Yes ☐ No ☐
4. In the last ten years, how many times has your property flooded to some extent?
   1 time: ☐ 2 times: ☑ 5 times: ☑ 10 or more times: ☐
5. When did the worst stormwater flooding event occur? Month: 8 Year: 2002
6. If you can recall, how many inches of rain fell during this storm event? I don't remember the worst, the last time was 3/2002 2½?
7. During this event, how long did it take for the water to drain after the highest level was reached?
   4 hours: ☑ 12 Hours: ☐ 1 day: ☐ 2 days or more: ☐
8. After this event, how long did water stand in.....
   streets?: 4 hours: ☑ 12 hours: ☐ 1 day: ☐ 2 days or more: ☐
   yard?: 4 hours: ☑ 12 hours: ☐ 1 day: ☐ 2 days or more: ☐
9. Do you have any photographs or videos of your flooding property or neighborhood?
   Yes ☑ No ☐ I gave mine to Charles Crawford (A neighbor) whose yard floods much worse than mine.

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859-258-3410 FAX: 859-258-3458

10. If yes, would you allow us to review and copy these photos and/or videos?
Yes ☑ No ☐

11. Are storm drains or ditches located on your property? Yes ☐ No ☑

12. Are there existing drainage easements on your property? Yes ☐ No ☑

13. Have you observed stream flooding in the vicinity of your house? Yes ☑ No ☐

14. If yes, how many times each year? ONCE or twice

15. Have you ever observed manholes overflowing in the vicinity of your house?
Yes ☑ No ☐ Not a manhole but water meter.

16. Have you contacted LFUCG previously about this problem? Yes ☐ No ☑
If yes, when: _____
Who did you speak with _____

17. Has any activity such as new construction, landscape, etc. occurred over the years that may have caused or increased your drainage problem? Yes ☑ No ☐
If yes, describe We (the neighbors) believe when WT Young Warehouse redid their parking lot, it slants down with no drains. We believe this had a great impact St Micheal, St Teresa & St Christopher when it rains.

18. Do you have a sump pump? Yes ☐ No ☑

19. Where does the sump pump discharge? Yard ☐ Storm Sewer ☐
Sanitary Sewer ☐ Garage ☐ Other ☐
If other, please describe _____

20. Have you experienced any sanitary sewer backups? Yes ☑ No ☐ But in the house, not

21. Have you noticed sanitary sewer odors during flooding events? Yes ☑ No ☐ outside.

Structural Flooding:

If water entered your house..... No water entered our home!

22. What area of your house flooded?
Basement: ☐ Crawl Space ☐ First Floor ☐ Garage ☐

23. How did it enter?
Through door: ☐ Through walls and/or cracks: ☐
Through window: ☐ Sewer back-up (through toilet/sinks): ☐
Floor drain: ☐ Other: _____ ☐

Please review the drawing on the attached sheet and sketch where flooding occurred and where and how it entered the house.

Flooding Sketch:

The drawing on the following sheet is a picture of the general area in which we believe you property is located. On the drawing please locate your house by the street address number and follow the instructions on how to sketch you flooding problems.

1. Outline and shade in the areas on your property and the adjacent properties where you recall flooding to have occurred during the worst storm event you can remember.
2. If stormwater entered your house, please place a big dot or star where you believe the water entered your house and name the "opening" through which it came (i.e. basement window, back basement door, floor drain, etc.....)

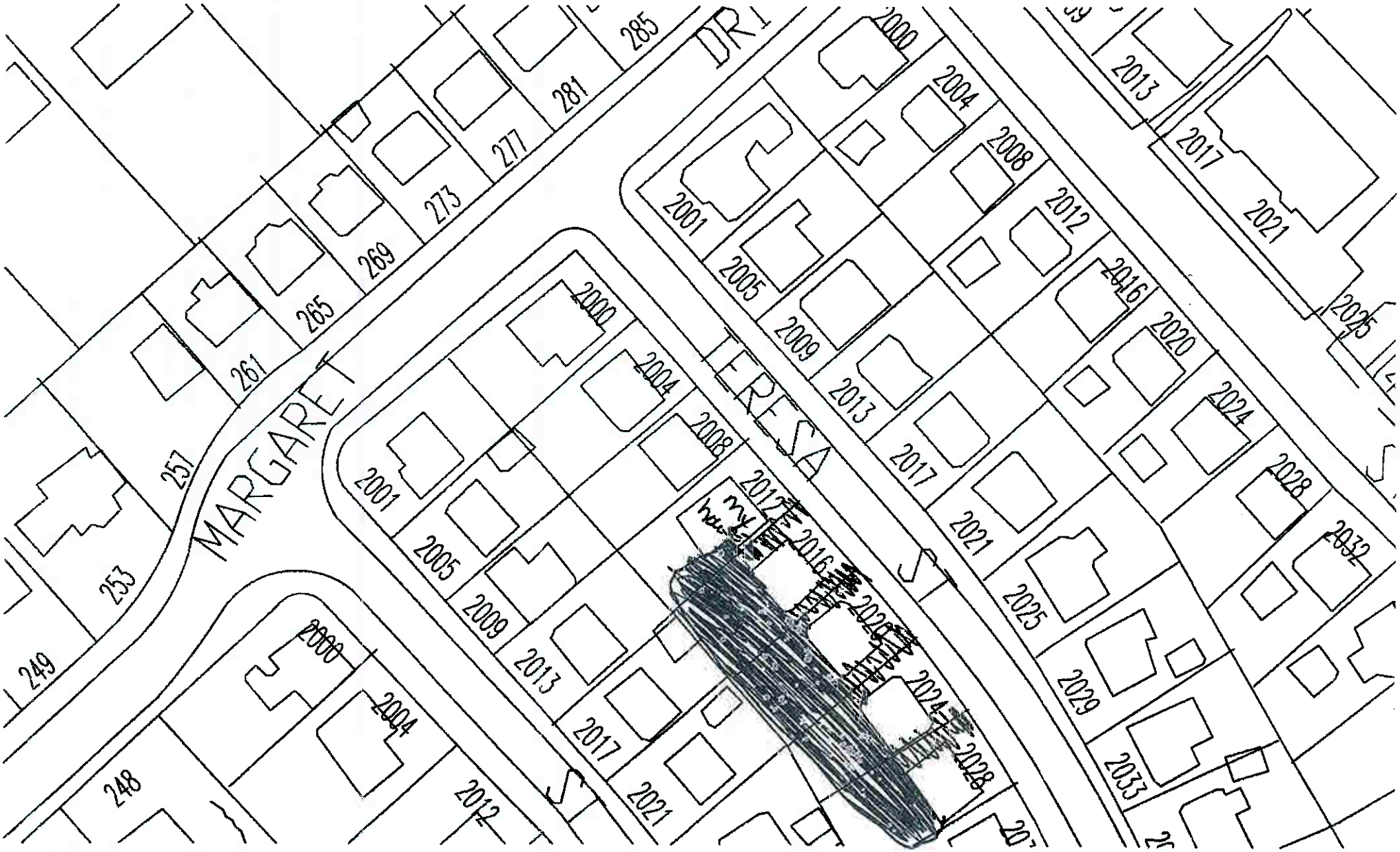
Remember to sketch....

where the highest level to which water has flooded on your property is located?
Please refer to a fixed object like a tree or part of the house and indicate how high the water rose (i.e. "The water was 2" deep on the big tree in my back yard.").

Briefly describe drainage problems: We get the least of the flooding of our neighbors. It floods about 1/3 of my yard & has come up to my step but not further. The worst of the worst is 2020, 2024, 2016 on our street.

The water coming up to the tree in my yard was about 4"

THANK YOU FOR YOU TIME!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Shaping Our Community

ENGINEERING

Resident Questionnaire
Idle Hour North
Stormwater Drainage Issues

(Please complete and return in the enclosed stamped envelope as soon as possible.)

First Name: Birdie Last Name: McKnight

Street Address (specify if mailing address is different):
2016 St Teresa Dr.

City: Lexington State: Ky Zip: 40502

Telephone: Work: ( ) Retired Home: (859) 266-6856

General Information:

1. How long have you lived at this address? 40 years
2. Has your property suffered flooding in the past? Yes ☑ No ☐

If Yes,....

3. What were the limits of flooding? (check all that apply)
   In Yard Yes ☑ No ☐
   In Street Yes ☑ No ☐
   In House Yes ☑ No ☐
   Under House
4. In the last ten years, how many times has your property flooded to some extent?
   1 time: ☐ 2 times: ☐ 5 times: ■ 10 or more times: ☒
5. When did the worst stormwater flooding event occur? Month: 06 Year: 1986
6. If you can recall, how many inches of rain fell during this storm event? 4 inches
7. During this event, how long did it take for the water to drain after the highest level was reached?
   4 hours: ☒ 12 Hours: ☐ 1 day: ☐ 2 days or more: ☐
8. After this event, how long did water stand in.....
   streets?: 4 hours: ☒ 12 hours: ☐ 1 day: ☐ 2 days or more: ☐
   yard?: 4 hours: ☒ 12 hours: ☐ 1 day: ☐ 2 days or more: ☐
9. Do you have any photographs or videos of your flooding property or neighborhood?
   Yes ☐ No ☒

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10. If yes, would you allow us to review and copy these photos and/or videos?
Yes ☐ No ☐

11. Are storm drains or ditches located on your property? Yes ☐ No ☒

12. Are there existing drainage easements on your property? Yes ☐ No ☒

13. Have you observed stream flooding in the vicinity of your house? Yes ☐ No ☒

14. If yes, how many times each year?_____

15. Have you ever observed manholes overflowing in the vicinity of your house?
Yes ☒ No ☒

• 16. Have you contacted LFUCG previously about this problem? Yes ☒ No ☐
If yes, when: 1986, 1992
Who did you speak with Bob Gastineau, Willie Fogle

17. Has any activity such as new construction, landscape, etc. occurred over the years that may have caused or increased your drainage problem? Yes ☐ No ☒
If yes, describe

_____

_____

_____

_____

18. Do you have a sump pump? Yes ☐ No ☒

19. Where does the sump pump discharge? Yard ☐ Storm Sewer ☐
Sanitary Sewer ☐ Not Sure ☐
If other, please describe_____.

20. Have you experienced any sanitary sewer backups? Yes ☐ No ☒

21. Have you noticed sanitary sewer odors during flooding events? Yes ☐ No ☒

Structural Flooding:

If water entered your house…..

•22. What area of your house flooded?
Basement: ☐ Crawl Space ☒ First Floor ☐ Garage ☐

23. How did it enter?

Through door:	☐	Through walls and/or cracks:	☐
Through window:	☐	Sewer back-up (through toilet/sinks):	☐
Floor drain:	☒	Other:_____	☐

Please review the drawing on the attached sheet and sketch where flooding occurred and where and how it entered the house.

Flooding Sketch:

The drawing on the following sheet is a picture of the general area in which we believe you property is located. On the drawing please locate your house by the street address number and follow the instructions on how to sketch you flooding problems.

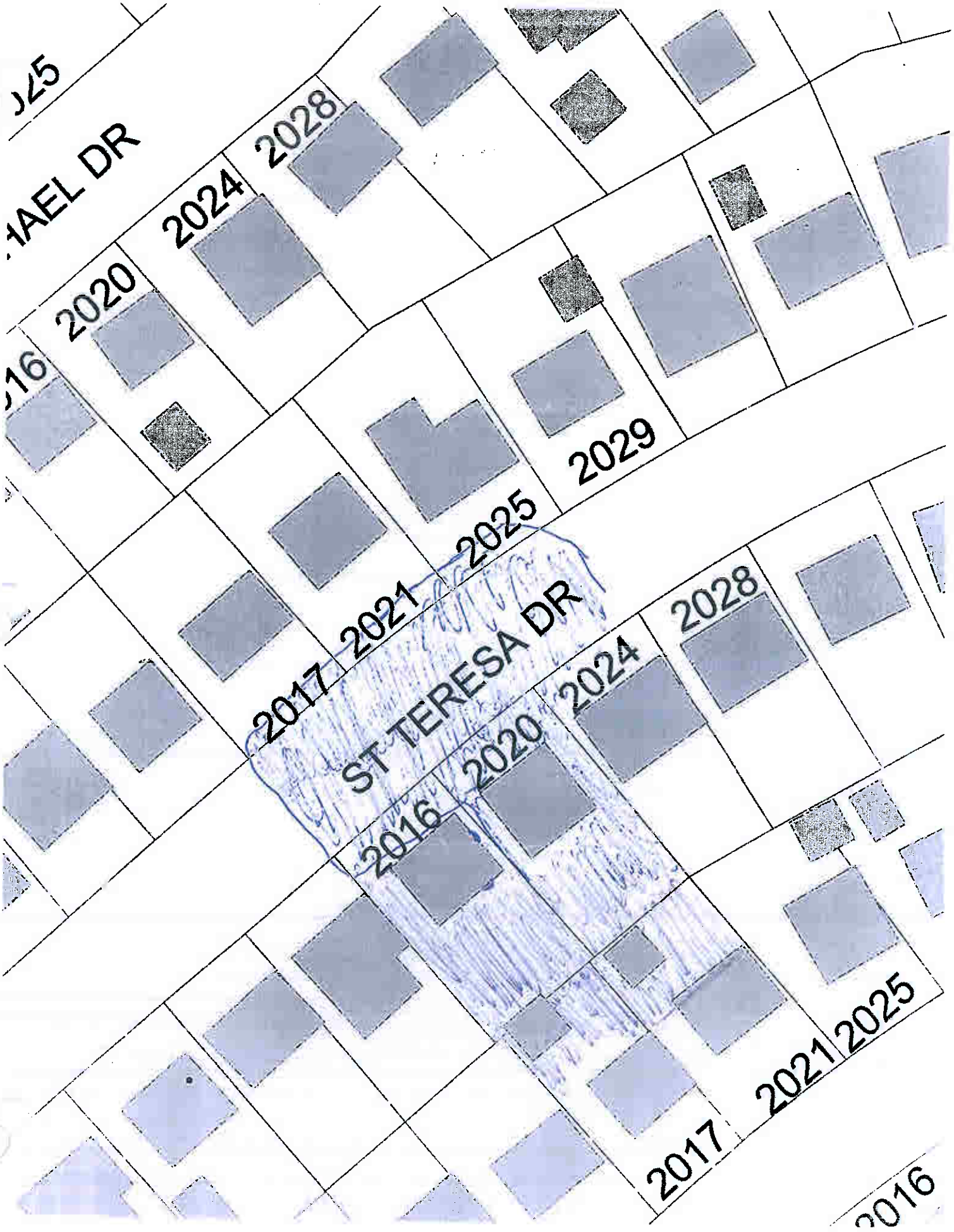
1. Outline and shade in the areas on your property and the adjacent properties where you recall flooding to have occurred during the worst storm event you can remember.
2. If stormwater entered your house, please place a big dot or star where you believe the water entered your house and name the "opening" through which it came (i.e. basement window, back basement door, floor drain, etc.....)

Remember to sketch....

where the highest level to which water has flooded on your property is located?
Please refer to a fixed object like a tree or part of the house and indicate how high the water rose (i.e. "The water was 2" deep on the big tree in my back yard.").

Briefly describe drainage problems: water runs between houses - storm drains inadequate to drain water from Young Dr or St. Michael. Waters roll downhill toward creek below St. Christopher.

THANK YOU FOR YOU TIME!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Shaping Our Community

ENGINEERING

Resident Questionnaire
Idle Hour North
Stormwater Drainage Issues

(Please complete and return in the enclosed stamped envelope as soon as possible.)

First Name: CHARLES Last Name: CRAWFORD

Street Address (specify if mailing address is different):
2020 ST TERESA DR

City: LEXINGTON State: KY Zip:

Telephone: Work: (-) 859-335-4706 Home: (-) 859-269-5902

General Information:

1. How long have you lived at this address? 21 YRS
2. Has your property suffered flooding in the past? Yes ☑ No ☐

If Yes,....

3. What were the limits of flooding? (check all that apply)
   In Yard Yes ☑ No ☐
   In Street Yes ☑ No ☐
   In House Yes ☑ No ☐
4. In the last ten years, how many times has your property flooded to some extent?
   1 time: ☐ 2 times: ☐ 5 times: ☐ 10 or more times: ☑
5. When did the worst stormwater flooding event occur? Month: June Year: 1986
6. If you can recall, how many inches of rain fell during this storm event? 5 ½ IN
7. During this event, how long did it take for the water to drain after the highest level was reached?
   4 hours: ☑ 12 Hours: ☐ 1 day: ☐ 2 days or more: ☐
8. After this event, how long did water stand in.....
   streets?: 4 hours: ☑ 12 hours: ☐ 1 day: ☐ 2 days or more: ☐
   yard?: 4 hours: ☑ 12 hours: ☐ 1 day: ☐ 2 days or more: ☐
9. Do you have any photographs or videos of your flooding property or neighborhood?
   Yes ☑ No ☐

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10. If yes, would you allow us to review and copy these photos and/or videos?
Yes ☑ No ☐

11. Are storm drains or ditches located on your property? Yes ☑ No ☐

12. Are there existing drainage easements on your property? Yes ☐ No ☐ Don't Know

13. Have you observed stream flooding in the vicinity of your house? Yes ☐ No ☑ N/A

14. If yes, how many times each year?_____

15. Have you ever observed manholes overflowing in the vicinity of your house?
Yes ☑ No ☐

16. Have you contacted LFUCG previously about this problem? Yes ☑ No ☐
If yes, when: 1986
Who did you speak with Don't Remember Toby Gastineau + Willie Fogle

17. Has any activity such as new construction, landscape, etc. occurred over the years that may have caused or increased your drainage problem? Yes ☐ No ☒
If yes, describe

_____

_____

_____

_____

18. Do you have a sump pump? Yes ☑ No ☐

19. Where does the sump pump discharge? Yard ☑ Storm Sewer ☐
Sanitary Sewer ☐ Not Sure ☐
If other, please describe_____

20. Have you experienced any sanitary sewer backups? Yes ☑ No ☐

21. Have you noticed sanitary sewer odors during flooding events? Yes ☑ No ☐

Structural Flooding:

If water entered your house…..

22. What area of your house flooded?
Basement: ☒ Crawl Space ☐ First Floor ☐ Garage ☐

23. How did it enter?

Through door:	☑	Through walls and/or cracks:	☐
Through window:	☐	Sewer back-up (through toilet/sinks):	☐
Floor drain:	☐	Other:_____	☐

Please review the drawing on the attached sheet and sketch where flooding occurred and where and how it entered the house.

Flooding Sketch:

The drawing on the following sheet is a picture of the general area in which we believe you property is located. On the drawing please locate your house by the street address number and follow the instructions on how to sketch you flooding problems.

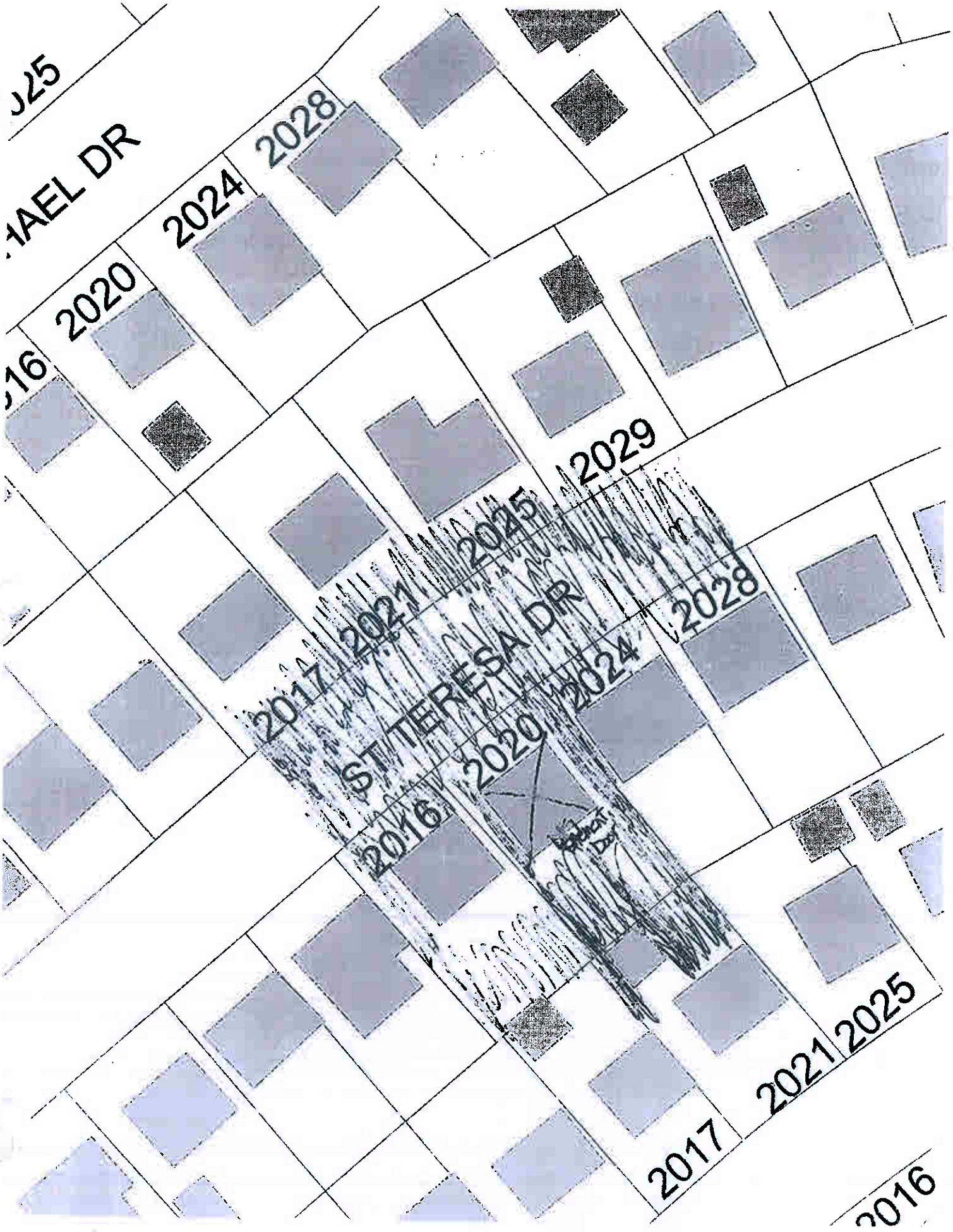
1. Outline and shade in the areas on your property and the adjacent properties where you recall flooding to have occurred during the worst storm event you can remember.
2. If stormwater entered your house, please place a big dot or star where you believe the water entered your house and name the "opening" through which it came (i.e. basement window, back basement door, floor drain, etc.....)

Remember to sketch....

where the highest level to which water has flooded on your property is located?
Please refer to a fixed object like a tree or part of the house and indicate how high the water rose (i.e. "The water was 2" deep on the big tree in my back yard.").

Briefly describe drainage problems: Water starts on Young Dr. and gains water + power draining toward the creek beside St. Christopher. It has rushed through our yard strong enough to wash out two stone walls in our back yard. It has gotten up to our front stoop about 2 feet. Our back yard stays wet unless there is a drought. It has been up to two feet high on the tree in our back yard.

THANK YOU FOR YOU TIME!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Shaping Our Community

ENGINEERING

Resident Questionnaire
Idle Hour North
Stormwater Drainage Issues

(Please complete and return in the enclosed stamped envelope as soon as possible.)

First Name: Bennie + Judy Last Name: Ginter

Street Address (specify if mailing address is different):
2024 St. Teresa Drive

City: Lexington State: Kentucky Zip: 40502

Telephone: Work: 859-254-7573 (344) Home: 859 266-0805

General Information:

1. How long have you lived at this address? 34 years

2. Has your property suffered flooding in the past? Yes ☒ No ☐

If Yes,....

3. What were the limits of flooding? (check all that apply)
   In Yard Yes ☒ No ☐
   In Street Yes ☒ No ☐
   In House Yes ☒ No ☐

4. In the last ten years, how many times has your property flooded to some extent?
   1 time: ☐ 2 times: ☐ 5 times: ☐ 10 or more times: ☒

5. When did the worst stormwater flooding event occur? Month:_____ Year:_____

6. If you can recall, how many inches of rain fell during this storm event?_____

7. During this event how long did it take for the water to drain after the highest level was reached?
   4 hours: ☒ 12 Hours: ☐ 1 day: ☐ 2 days or more: ☐

8. After this event, how long did water stand in.....
   streets?: 4 hours: ☒ 12 hours: ☐ 1 day: ☐ 2 days or more: ☐
   yard?: 4 hours: ☒ 12 hours: ☐ 1 day: ☐ 2 days or more: ☐

9. Do you have any photographs or videos of your flooding property or neighborhood?
   Yes ☐ No ☐

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10. If yes, would you allow us to review and copy these photos and/or videos?
Yes ☐ No ☐

11. Are storm drains or ditches located on your property? Yes ☒ No ☐

12. Are there existing drainage easements on your property? Yes ☒ No ☐

13. Have you observed stream flooding in the vicinity of your house? Yes ☐ No ☐

14. If yes, how many times each year?_____

15. Have you ever observed manholes overflowing in the vicinity of your house?
Yes ☐ No ☐

16. Have you contacted LFUCG previously about this problem? Yes ☒ No ☐
If yes, when: Don't Recall
Who did you speak with Don't Recall

17. Has any activity such as new construction, landscape, etc. occurred over the years that may have caused or increased your drainage problem? Yes ☐ No ☒
If yes, describe

_____

_____

_____

_____

18. Do you have a sump pump? Yes ☐ No ☒

19. Where does the sump pump discharge? Yard ☐ Storm Sewer ☐
Sanitary Sewer ☐ Not Sure ☐
If other, please describe_____.

20. Have you experienced any sanitary sewer backups? Yes ☐ No ☒

21. Have you noticed sanitary sewer odors during flooding events? Yes ☐ No ☒

Structural Flooding:

If water entered your house…..

22. What area of your house flooded?
Basement: ☒ Crawl Space ☐ First Floor ☐ Garage ☐

23. How did it enter?
Through door: ☒ Through walls and/or cracks: ☒
Through window: ☐ Sewer back-up (through toilet/sinks): ☐
Floor drain: ☐ Other:_____ ☐

Please review the drawing on the attached sheet and sketch where flooding occurred and where and how it entered the house.

Flooding Sketch:

The drawing on the following sheet is a picture of the general area in which we believe you property is located. On the drawing please locate your house by the street address number and follow the instructions on how to sketch you flooding problems.

1. Outline and shade in the areas on your property and the adjacent properties where you recall flooding to have occurred during the worst storm event you can remember.
2. If stormwater entered your house, please place a big dot or star where you believe the water entered your house and name the "opening" through which it came (i.e. basement window, back basement door, floor drain, etc.....)

Remember to sketch....

where the highest level to which water has flooded on your property is located?
Please refer to a fixed object like a tree or part of the house and indicate how high the water rose (i.e. "The water was 2" deep on the big tree in my back yard.").

Briefly describe drainage problems:

THE STREET drain ON St. TERESA DRIVE CAN NOT HANDLE ALL THE WATER FROM YOUNG DRIVE AND St. MICHAEL DRIVE.

THE WATER FLOWS between HOUSES AS INDICATED on the MAP. IT BACKS UP IN FRONT of 2016, 2020, + 2024 St. TERESA. IT ALSO OVERFLOWS THE DRAIN IN THE BACKYARD of 2024 St. TERESA AND FLOODS THE BACKYARDS of 2020, 2024 St. TERESA. IT ALSO FLOODS THE back yards of 2021 + 2025 St Christopher Dr.

TOO MUCH WATER FOR ONE DRAIN

THANK YOU FOR YOU TIME!

THANK YOU FOR YOUR CONCERN Daniel L. Ritter

Young Dr. Needs

Shaping Our Community

ENGINEERING

Resident Questionnaire
Idle Hour North
Stormwater Drainage Issues

(Please complete and return in the enclosed stamped envelope as soon as possible.)

First Name: Tanya Last Name: Medley

Street Address (specify if mailing address is different):
2025 St. Teresa Dr. (moved) (833 Burkewood Dr. Lex, Ky 40509)

City: Lexington State: Ky Zip: 40502

Telephone: Work: 859 335 - 3749 Home: ( )

General Information:

1. How long have you lived at this address? 3 1/2 5.
2. Has your property suffered flooding in the past? Yes ☐ No ☑

If Yes,.... N/A

3. What were the limits of flooding? (check all that apply)
   In Yard Yes ☐ No ☐
   In Street Yes ☐ No ☐
   In House Yes ☐ No ☐
4. In the last ten years, how many times has your property flooded to some extent? N/A
   1 time: ☐ 2 times: ☐ 5 times: ☐ 10 or more times: ☐
5. When did the worst stormwater flooding event occur? Month: ____ Year: N/A
6. If you can recall, how many inches of rain fell during this storm event? N/A
7. During this event, how long did it take for the water to drain after the highest level was reached?
   4 hours: ☐ 12 Hours: ☐ 1 day: ☐ 2 days or more: ☐
8. After this event, how long did water stand in.....
   streets?: 4 hours: ☐ 12 hours: ☐ 1 day: ☐ 2 days or more: ☐
   yard?: 4 hours: ☐ 12 hours: ☐ 1 day: ☐ 2 days or more: ☐ N/A
9. Do you have any photographs or videos of your flooding property or neighborhood?
   Yes ☐ No ☑

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10. If yes, would you allow us to review and copy these photos and/or videos?
Yes ☐ No ☐

11. Are storm drains or ditches located on your property? Yes ☑ No ☐

12. Are there existing drainage easements on your property? Yes ☑ No ☐

13. Have you observed stream flooding in the vicinity of your house? Yes ☐ No ☑

14. If yes, how many times each year?_____

15. Have you ever observed manholes overflowing in the vicinity of your house? drain overflow in front of house
Yes ☑ No ☐

16. Have you contacted LFUCG previously about this problem? Yes ☐ No ☑ 1 time
If yes, when:_____
Who did you speak with_____ lasted 1 hr.

17. Has any activity such as new construction, landscape, etc. occurred over the years that may have caused or increased your drainage problem? Yes ☐ No ☑ in Aug. '02
If yes, describe

_____

_____

_____

_____

18. Do you have a sump pump? Yes ☐ No ☑

19. Where does the sump pump discharge? Yard ☐ Storm Sewer ☐
Sanitary Sewer ☐ Not Sure ☐
If other, please describe_____

20. Have you experienced any sanitary sewer backups? Yes ☐ No ☑

21. Have you noticed sanitary sewer odors during flooding events? Yes ☐ No ☑

Structural Flooding:

If water entered your house…..

22. What area of your house flooded? N/A
Basement: ☐ Crawl Space ☐ First Floor ☐ Garage ☐

23. How did it enter?
Through door: ☐ Through walls and/or cracks: ☐
Through window: ☐ Sewer back-up (through toilet/sinks): ☐
Floor drain: ☐ Other:_____ ☐

Please review the drawing on the attached sheet and sketch where flooding occurred and where and how it entered the house.

Flooding Sketch:

The drawing on the following sheet is a picture of the general area in which we believe you property is located. On the drawing please locate your house by the street address number and follow the instructions on how to sketch you flooding problems.

1. Outline and shade in the areas on your property and the adjacent properties where you recall flooding to have occurred during the worst storm event you can remember.
2. If stormwater entered your house, please place a big dot or star where you believe the water entered your house and name the "opening" through which it came (i.e. basement window, back basement door, floor drain, etc.....)

Remember to sketch....

where the highest level to which water has flooded on your property is located?
Please refer to a fixed object like a tree or part of the house and indicate how high the water rose (i.e. "The water was 2" deep on the big tree in my back yard.").

Briefly describe drainage problems: _____

_____

_____

_____

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_____

THANK YOU FOR YOU TIME!

Shaping Our Community

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ENGINEERING

SHOULD HAVE BEEN FOR 2017 St. Teresa

Resident Questionnaire
Idle Hour North
Stormwater Drainage Issues

(Please complete and return in the enclosed stamped envelope as soon as possible.)

First Name: DAVID Last Name: WILLIAMS

Street Address (specify if mailing address is different):

1506 RUSSELL CAVE RD.

City: LEX. State: KY. Zip: 40505

Telephone: Work: (859) 420-3283 Home: (859) 299-8873

General Information:

1. How long have you lived at this address? 16 YRS.
2. Has your property suffered flooding in the past? Yes ☐ No ☑

If Yes,....

3. What were the limits of flooding? (check all that apply)
   - In Yard Yes ☐ No ☐
   - In Street Yes ☐ No ☐
   - In House Yes ☐ No ☐
4. In the last ten years, how many times has your property flooded to some extent?
   1 time: ☐ 2 times: ☐ 5 times: ☐ 10 or more times: ☐
5. When did the worst stormwater flooding event occur? Month:______ Year:______
6. If you can recall, how many inches of rain fell during this storm event?______
7. During this event, how long did it take for the water to drain after the highest level was reached?
   4 hours: ☐ 12 Hours: ☐ 1 day: ☐ 2 days or more: ☐
8. After this event, how long did water stand in.....
   streets?: 4 hours: ☐ 12 hours: ☐ 1 day: ☐ 2 days or more: ☐
   yard?: 4 hours: ☐ 12 hours: ☐ 1 day: ☐ 2 days or more: ☐
9. Do you have any photographs or videos of your flooding property or neighborhood?
   Yes ☐ No ☐

10. If yes, would you allow us to review and copy these photos and/or videos?
Yes ☐ No ☐

11. Are storm drains or ditches located on your property? Yes ☑ No ☐

12. Are there existing drainage easements on your property? Yes ☑ No ☐

13. Have you observed stream flooding in the vicinity of your house? Yes ☐ No ☑

14. If yes, how many times each year?_____

15. Have you ever observed manholes overflowing in the vicinity of your house?
Yes ☑ No ☐

16. Have you contacted LFUCG previously about this problem? Yes ☑ No ☐
If yes, when: 2001 MOST RECENT. - HAVE ALWAYS HAD THIS PROBLEM
Who did you speak with ?

17. Has any activity such as new construction, landscape, etc. occurred over the years that may have caused or increased your drainage problem? Yes ☑ No ☐
If yes, describe
IN 2001 NEW SANITARY SEWER LINES WERE INSTALLED & WE NOW FREQUENTLY HAVE AN ODOR OF SEWAGE ALONG THE CREEK

18. Do you have a sump pump? Yes ☐ No ☑

19. Where does the sump pump discharge? Yard ☐ Storm Sewer ☐
Sanitary Sewer ☐ Not Sure ☐
If other, please describe_____

20. Have you experienced any sanitary sewer backups? Yes ☑ No ☐

21. Have you noticed sanitary sewer odors during flooding events? Yes ☐ No ☐
→ WERE ESPECIALLY NOTICABLE DURING THE DROUGHT THIS YEAR, SUMMER 2002.

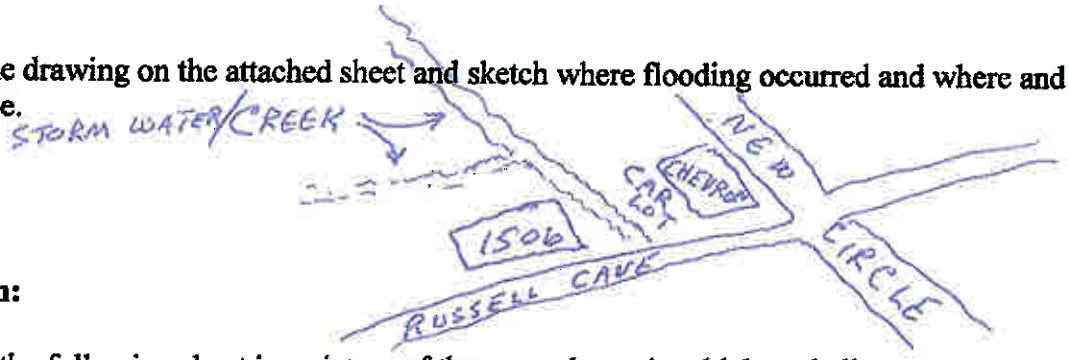
Structural Flooding:

If water entered your house.....

22. What area of your house flooded?
Basement: ☐ Crawl Space ☐ First Floor ☐ Garage ☐

23. How did it enter?
Through door: ☐ Through walls and/or cracks: ☐
Through window: ☐ Sewer back-up (through toilet/sinks): ☐
Floof drain: ☐ Other:_____ ☐

Please review the drawing on the attached sheet and sketch where flooding occurred and where and how it entered the house.



Flooding Sketch:

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1. Outline and shade in the areas on your property and the adjacent properties where you recall flooding to have occurred during the worst storm event you can remember.
2. If <u>stormwater</u> entered your house, please place a big dot or star where you believe the water entered your house and name the "opening" through which it came (i.e. basement window, back basement door, floor drain, etc.....)

Remember to sketch....

where the highest level to which water has flooded on your property is located?
Please refer to a <u>fixed</u> object like a tree or part of the house and indicate how high the water rose (i.e. "The water was 2" deep on the big tree in my back yard.").

Briefly describe drainage problems: WE HAVE SEEN THE STORMWATER DRAINAGE AREA (OPEN DITCH/CREEK) FULL BUT HAVE NOT HAD WATER IN OUR HOUSE. WE HAVE SEEN WATER "PONDING" IN ELKHORN PARK WHICH I THINK WOULD BE NORMAL. BEFORE NEW SANITARY SEWER LINES, WE EXPERIENCED SEWAGE BACKING UP IN OUR BATHTUB DURING ANY TYPE OF SUBSTANCIAL RAIN. AFTER NEW SAN. SEWER LINES WERE INSTALLED WE HAVE SO FAR NOT EXPERIENCED ANY BACK-UP IN THE BATHTUB BUT THERE IS OFTEN A STRONG ODOR OF SEWAGE ALONG THE MAIN PART OF THE CREEK AT RUSSELL CAVE RD AND THE (3' WIDE PATH) AREA OF NEW SOD WHERE THE SEWER LINE IS LOCATED IS DEAD ALTHOUGH OTHER NEW SOD LAID AT THE SAME TIME IS DOING FINE. I WOULD LIKE TO BE CONTACTED BY YOUR OFFICE IN REGARDS TO THE SMELL OF SEWAGE. THE MAP YOU SENT ME IS NOT MY AREA, IT LOOKS LIKE IDLE HOUR

THANK YOU FOR YOU TIME!

APPENDIX C

COST ESTIMATES

Idle Hour North Preliminary
Opinion of Probable Project Cost
Alternative 1 - Reroute and Add Catch Basins
6-Mar-12

ITEM		UNIT COST	UNIT	QUANTITY	COST
18" Concrete Pipe		$50	LF	800	$40,000
19" x 30" Elliptical Concrete Pipe		$60	LF	160	$9,600
30" Concrete Pipe		$90	LF	300	$27,000
36" Concrete Pipe		$120	LF	850	$102,000
42" Concrete Pipe		$150	LF	160	$24,000
Curb Inlet Type B		$3,400	each	12	$40,800
Manhole		$6,000	each	4	$24,000
Headwall		$1,500	each	1	$1,500
Remove and Replace Curb, sidewalk		$42	LF	1850	$77,700
Mill existing asphalt pavement		$1	Sq Yd	8350	$8,350
Overlay milled asphalt		$6	Sq Yd	8350	$50,100
Pavement Replacement-Trench		$50	LF	2100	$105,000
Sod		$3	Sq Ft	1000	$3,000
Subtotal					**$513,050**
25% Construction Contingency					**$128,000**
Total Opinion of Construction Cost					**$641,000**
Non-Construction Costs					
Property Acquisition /Easements		$3	Sq Ft	1000	**$3,000**
Professional Services*		9.62%	-		$61,700
Subtotal					**$64,700**
				TOTAL	**$706,000**

*No resident observation included

Idle Hour North Preliminary
Opinion of Probable Cost
Alternative 2- Larger Pipes in Current Location
6-Mar-12

ITEM		UNIT COST	UNIT	QUANTITY	COST
18" Concrete Pipe		$50	LF	1100	$55,000
19" x 30" Elliptical Concrete Pipe		$60	LF	160	$9,600
30" Concrete Pipe		$90	LF	130	$11,700
36" Concrete Pipe		$120	LF	30	$3,600
36" Concrete Pipe (between/behind homes)		$150	LF	230	$34,500
42" Concrete Pipe		$150	LF	60	$9,000
42" Concrete Pipe (between/behind homes)		$180	LF	460	$82,800
Curb Inlet Type B		$3,400	each	14	$47,600
Manhole		$6,000	each	2	$12,000
Remove and Replace Curb, sidewalk		$42	LF	1200	$50,400
Pavement Replacement-Trench		$50	LF	1550	$77,500
Mill existing asphalt pavement		$1	Sq Yd	1070	$1,070
Overlay milled asphalt		$6	Sq Yd	1070	$6,420
Sod		$3	Sq Ft	6000	$18,000
Subtotal					**$419,190**
25% Construction Contingency					**$105,000**
Total Opinion of Construction Cost					**$524,000**
Non-Construction Costs					
Property Acquisition /Easements		$3	Sq Ft	16,000	**$48,000**
Professional Services*		10.20%	-		$53,400
Subtotal					**$101,400**
				TOTAL	**$625,000**

*No resident observation included

Idle Hour North Preliminary
Opinion of Probable Cost
Alternative 3- Purchase Homes
30-Jan-12

Acquistion		PVA Value	20% PVA	Acq and Demo	COST
2020 St Michael		$93,000	$18,600	$26,000	$137,600
2016 St Teresa		$85,000	$17,000	$26,000	$128,000
2020 St Teresa		$100,000	$20,000	$26,000	$146,000
2024 St Teresa		$103,000	$20,600	$26,000	$149,600
2016 St Christopher		$105,000	$21,000	$26,000	$152,000
2020 St Christopher		$102,000	$20,400	$26,000	$148,400
				TOTAL	**$861,600**